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THE
FIRST LINES
OF THE
PRACTICE OF SURGERY:

DESIGNED AS
AN INTRODUCTION FOR STUDENTS,
AND
A CONCISE BOOK OF REFERENCE FOR PRACTITIONERS.

VOL. I.

THE FOURTH EDITION,
CORRECTED AND ENLARGED.

WITH SEVERAL NEW COPPER PLATES.

By SAMUEL COOPER,
LATE SURGEON TO THE FORCES
MEMBER OF THE COLLEGE OF SURGEONS, OF THE MEDICAL AND CHIRURGICAL SOCIETY
OF LONDON, AND OF THE MEDICAL SOCIETY OF MARSEILLES, &c.

LONDON:
PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN; HIGHLEY AND
SON; J. CALLOW; T. AND G. UNDERWOOD; ANDERSON AND CHASE; BURGESS AND HILL: AND FOR A. BLACK, FAIRBAIRN AND ANDERSON, AND
P. BROWN, EDINBURGH.
1819.

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KING'S COLLEGE LONDON

Printed by Strahan and Spottiswoode,
Printers-Street, London.

PREFACE

TO THE

FOURTH EDITION.

On presenting this work once more to the profession, in (what I conceive to be) a very improved form, it is quite unnecessary to trouble the reader with a long and tedious preface. The book was originally written as an introduction to surgery, at a period when the want of such a publication was universally acknowledged. Its plan was suggested by a perusal of Richter's Elements of Surgery; and if I am rightly informed, the simple and convenient arrangement into General and Particular Surgical Subjects, adopted in imitation of the method selected by that distinguished Professor, is well spoken of by several excellent judges. The First Lines of the Practice of Surgery have now passed through three editions, amounting to six thousand copies; a fact which speaks more strongly in favour of the usefulness of the work, than any other arguments, which might here be urged. The circumstance also of such patronage having been conferred, when the publication was far less correct than it is at present, augurs very favourably for the success of this fourth edition, with which considerable pains have been taken. If the reader wishes to know what has been done for the improvement of the work, I must refer him to every chapter, and nearly every page in the volume for an answer, since to particularize all the changes in this place would be impossible. Let him turn especially to the table of contents, and to the different chapters on Inflammation, Suppuration, Hectic Fever, Mortification, Burns, Effects of Cold, Wounds in General, Gunshot-Injuries, Aneurism, Cancer, Syphilis, Dislocations in General, Injuries of the Head, Encephalocele, Diseases of the Eyes, Wry-neck, Wounds of the Throat, Thorax, and Abdomen, and Hernia. On all these important topics, the remarks will be found much more correct and instructive, than in any of the former editions. The chapter on Syphilis contains a tolerably full account of the recent investigations concerning that perplexing disease; together with a summary of the opinions espoused by Mr. Carmichael. Perhaps, a few determined adherents to the Hunterian doctrines, respecting lues venerea, will be inclined to censure me, for having assisted in the promulgation of the new observations on this unsettled and mysterious subject. But, the conduct, which I have pursued, has been dictated by a conscientious belief, that the more we do to keep up the present enquiry, the more likely we are in the end to arrive at a knowledge, as well of the causes of the various forms of disease which have been confounded with syphilis, as of their distinguishing characters and best method of cure. In particular, I join Mr. Carmichael in thinking, that the employment of Dr. Willan's expressive and descriptive language by all British medical writers, in their accounts of morbid appearances on the skin, will have the most beneficial effect in preventing a great deal of the confusion, which has generally prevailed, in deciding what eruptions are to be set down as truly syphilitic, or not. We shall see, that Mr. Carmichael is himself persuaded of the actual existence of several venereal poisons; each of which he supposes capable of producing peculiar primary and secondary effects. That such varieties of disease exist, daily and manifold experience proclaims; but, though it is also commonly admitted by modern surgeons, that lues and the virulent gonorrhœa depend upon distinct infections, I would not wish to be considered altogether as a believer in this hypothesis of a plurality of venereal poisons, as the cause and explanation of the many differences and anomalies which are observed. At present, the evidence on this point is defective; and I should not be inclined to adopt all Mr. Carmichael's ideas respecting it, unless they were corroborated by the results of such inoculations, as it would be difficult to institute. The question, however, is interesting, and Mr. Carmichael's sentiments entitled to serious consideration. When the last edition of the Dictionary was published, I hoped, that few things, worthy of notice, had escaped my attention: the present volume will prove how mistaken I was; for, its chapters abound with observations and proposals not contained in the other publication. Whoever, therefore, wishes to possess all the different views and reflections, which I have to offer on surgery in general, must refer in future to both works. Omissions in one book are frequently made amends for by what is inserted in the other; and points, but slightly touched upon in one, may be in the other more fully, and sometimes more satisfactorily, explained. In these respects, I consider the two publications as essentially connected, and serving to illustrate each other.

I have only one more circumstance to mention, viz. that as the limits of this volume obliged me to stop with the subject of hernia, a continuation of the work will be produced next winter, in the form of a second volume, containing, in addition to chapters now omitted, some other practical subjects, not noticed either in the Dictionary, or the last edition of this publication.

South Crescent, Bedford-Square,
April 12th, 1819.

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Page 609. line 23. for " extravasation *of*," read " extravasation *in*."
619. 1. for " *are*," read " *is*."

THE
FIRST LINES
OF THE
PRACTICE OF SURGERY.

CHAP. I.

INFLAMMATION.*

As there are few chirurgical diseases, in which the process of inflammation is not concerned, either as a cause, a symptom, a complication, or even as a means, or mode of cure, no subject has a prior and stronger claim to the attention of the practical surgeon. It is an affection, which may occur in every texture, where blood-vessels exist, and consequently nearly all parts of the body are liable to its attack. Pain, swelling, heat, and redness, its four most remarkable local symptoms, have been well and correctly described by Celsus, to whose account of the diagnosis the industry of many centuries has made but little addition. We are not to suppose, however, that these effects prevail in an equal degree in every instance of the process; nor, that they are all of them constantly manifest. While they characterize the most common forms of inflammation, there are other cases, in which only one or two of them are very apparent. Thus, in erythema, we have redness, without swelling; in chronic inflammation, a great deal of tumor, frequently unaccompanied either with pain, or change of colour.

Inflammation may be *active*, or *passive*; *acute*, or *chronic*; *common*, or *specific*; *simple*, or *complicated* with disease; the morbid inflammations being as numerous as diseases themselves are; as, for instance, erysipelatous, venereal, scrofulous, scorbutic, variolous, gouty, vaccine, rheumatic, &c.

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* J. Hunter on the Blood, Inflammation, and Gunshot Wounds, 4to. Lond. 1795. Burns's Dissertations on Inflammation, 2 vols. 8vo. Glasgow, 1800. J. Thomson's Lectures on Inflammation, 8vo. Edinb. 1813. Th. Gruithuisen, Theorie der Entzündung in der Med. Chir. Zeitung, 1816. b. 2. s. 129.

Acute healthy inflammation is not uncommonly named *phlegmon*, and sometimes *true*, or *genuine*; *common*, or *simple* inflammation. A severe throbbing pain in the part affected; a hard, prominent, tense, circumscribed swelling; an increase of heat in the seat of the complaint; and a bright redness, which gradually fades away at the circumference of the tumor; are the ordinary local symptoms. The functions of the inflamed part are either abolished or performed with difficulty and irregularity. The increase of temperature, which is at first local, afterwards extends in every case of importance over the whole body, the patient becoming affected with the general indisposition, well known amongst medical men by the name of *symptomatic*, or *sympathetic inflammatory fever.*

During the existence of inflammation, blood taken away by the lancet in a projecting stream, received into small vessels with polished internal surfaces, and cooled in a moderate temperature*, presents a particular appearance on its surface termed the *buffy coat*, or *inflammatory crust.* This consists of a stratum of coagulating lymph nearly free from the red globules. Such blood is often called *sizy.* The lymph coagulates very firmly, so as to squeeze out an unusual quantity of serum, in which it appears to float. I believe no very correct explanation of the cause of the buffy coat has yet been offered. The following attempt, however, has been made to account for it. The colouring matter of the blood is known to be its heaviest part, and even to acquire, according to Mr. Hunter †, an increase of weight in inflammation. In such a case, the lymph is observed to coagulate with extraordinary slowness, and hence, the red globules sink a considerable way from the surface, before being entangled in the coagulum. Yet, the accuracy of this statement is rendered doubtful by the fact that, when blood does not coagulate at all, like that which is naturally discharged from the uterus, or that which is found in persons, who have encountered particular modes of sudden death, the globules are remarked not to gravitate. Unless, therefore, they really acquire an increase of weight in inflammation, the formation of the buffy coat must be referred to some other principle.

The preceding appearances of the blood are sometimes a better criterion of the existence of inflammation, and of the propriety of bleeding, than the state of the pulse itself. Many internal, visceral inflammations cause such weakness of the pulse, that the surgeon is afraid to employ the lancet; but upon the experiment being made, the sizy appearance of the blood confirms the prudence of the measure. It should be remembered, however, that the blood, taken from pregnant women, and from a few other individuals of anomalous constitutions, always presents the inflammatory crust, whether inflammation be existing, or not. According to a late very experienced and intelligent writer, the same appearance of this fluid is sometimes observed in cases of hæmorrhage and synocha, quite unaccompanied with any marks of local inflammation. He has also seen, though rarely, a similar state of the blood in very old persons, in whom there were no vestiges of local inflammation, and a pulse not above sixty or seventy. He has noticed the same thing in patients called nervous, who were quite free from topical inflammation, with a soft, and even a weak pulse, not exceeding seventy-two. *

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* Parry's Elements of Pathology and Therapeutics, vol. i. p. 70. 8vo. Bath, 1815.

† Treatise on the Blood, Inflammation, and Gunshot Wounds, p. 313—315. 4to. Lond. 1794.

I have already explained, that, we do not find all the four principal local symptoms, pain, heat, redness, and swelling, evinced in every example of inflammation: and that, collectively, they are to be expected only in certain forms of this affection. Variety seems indeed to be one of the characters of inflammation in general, and phlegmon itself does not constantly exhibit exactly the same phenomena. Several of its symptoms may be obscured, or essentially altered in consequence of the particular situation, structure, and nature of the part affected. The different effects, also, resulting from the disturbance of the functions of various organs must obviously produce a material diversity in the symptoms. Thus, when the viscera or other deep-seated parts are inflamed, the swelling, redness, and throbbing are of course not manifest to the eye, or touch. But, though the diagnosis may receive no elucidation from such symptoms, the nature of the disorder still betrays itself by the prevalence of inflammatory fever; the situation of the pain; the particular functions impeded or disturbed; and the sizy appearance of the blood.

The more we attend to the nature of the process of inflammation, the more we shall be convinced of a truth, which that great pathologist Mr. Hunter always inculcated; namely, that the situation, position, structure, functions, and distance of the part affected from the source of the circulation, make great differences in the symptoms, progress, and termination

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* Parry, Op. cit. vol. i. p. 71.

of all inflammation. Parts, in which the blood circulates vigorously, generally bear inflammation best. But, vital organs, though exceedingly vascular, do not undergo in-inflammation favourably, because, as Mr. Hunter remarks, the natural operations of universal health depend so intimately upon their sound and undisturbed condition. A low, depending position has likewise a bad effect upon inflammation, probably, as Mr. Hunter conceived, by retarding the return of blood in the veins. All new-formed parts, such as cicatrices, and many kinds of swellings and excrescences, are well known to be incapable of bearing any serious degree of inflammation, an attack of which makes them either mortify or ulcerate.

The redness of inflamed parts appears to arise from the dilatation of small vessels, veins * as well as arteries, which become large enough to admit the red globules in abundance. Mr. Hunter had an idea, that the redness partly depended, in some instances, upon the generation of new vessels. In ordinary cases, however, none of the redness can be ascribed to such a cause; for, a part may be reddened in a few seconds by friction, the application of heat, &c., in which circumstance, there cannot be time for the formation of additional vessels. Nor is it easy to fancy how new-formed vessels could be removed so quickly, as they would be in cases where the inflamed parts rapidly fall into their natural state again, retaining not the slightest vestige of increased vascularity. The fact also of many parts, which are naturally colourless, being rendered quite red by anatomical injection, tends to prove, that the distention of vessels already existing, will alone account for the increased redness. Yet, we are, with a celebrated professor †, duly to remember the curious circumstance of blood-vessels becoming visible during inflammation in organs, which can never be made to indicate any vascularity, as far as can be learned from the use of fine anatomical injections; a fact, which induces Meckel to adopt the Hunterian doctrine, that new vessels are sometimes actually produced in the process of inflammation, particularly when it affects parts, which are not very vascular, like the cornea. " Perhaps," says he, " a variety of organization may make an important difference in this respect. As in very vascular organs, the small vessels carry red blood, probably no new vessels are formed in inflammation, and the original ones are only distended; while

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* Hunter on the Blood, &c. p. 282. Thomson's Lectures on Inflammation, p. 87. Op. cit. p. 283.

† See Meckel's Handbuch der Pathologischen Anatomie 2ter. b. 2ter. abth. p. 23. Leipzig, 1818.

in unvascular organs, like the cornea, vessels are developed, without which inflammation could not take place."

In inflammation of the tunica conjunctiva of the eye, the redness at first reaches only to the circumference of the cornea; and, however violent the affection may be, vessels are not seen on the latter membrane till after the inflammation has existed some time. The cornea is also not every where red, as it probably would be, if the appearance of vessels in it depended upon the dilatation of arteries and veins previously existing there; but the redness is usually limited to the external surface. In a few rare cases, however, the whole cornea becomes penetrated with these apparently new-formed vessels, and changed into a very vascular substance; a state, which chiefly occurs, when the inflammation is severe at its commencement, and then abates, and recurs at short * intervals. Although I have deemed it right to make a brief statement of the preceding arguments, I am far from coinciding with Professor Meckel, that the question of the formation of new vessels in inflammation gains much support from the circumstance of inflamed parts exhibiting a vascularity, which could not be demonstrated in their healthy state. On the contrary, I believe, that inflammation can never happen, except where vessels are situated. All the phenomena of this process are a proof of their presence. As I have described, it unquestionably enlarges them, and renders them capable of receiving red blood. It is on this principle, that we can account for their becoming visible, when no injection would perviate them in their ordinary state. No sound physiologist, in short, will now argue, that parts are not vascular, because the vessels cannot be discerned; and he judges of the question more accurately, by considering what mutations each structure appears to exhibit in health and disease. Whatever doubts, however, may hang over this subject, with respect to the more familiar examples of inflammation, it is universally allowed, that new vessels are frequently developed in the coagulating lymph effused on the surfaces of inflamed serous membranes, in fresh wounds, many instances of chronic inflammation, and new growths, as will be hereafter explained.

In cases of ophthalmy, the surgeon has an excellent opportunity of observing the dilatation of the vessels, and the consequent appearance of redness: enlarged vessels, which naturally held only a colourless fluid, not only present themselves in myriads upon the conjunctiva, but extend their branches over the cornea itself. The enlargement of the smaller vessels, and

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* Op. et tom. cit. p. 25.; and E. A. Noble's Treatise on Ophthalmy, p. 4, 5.

the increase in the number of those, which become capable of containing red blood, are facts which can be seen by the naked eye; and they may be rendered still more obvious by means of the microscope, and the art of injecting. Hunter froze the ear of a rabbit, and thawed it again. This produced a considerable inflammation, and an increased heat, and thickening of the part. While the ear was in a state of violent inflammation the animal was killed; the head injected; and the two ears removed and dried. The uninflamed ear dried clear, and transparent, and its vessels could be plainly seen ramifying through its substance; but, the inflamed ear dried thicker and more opaque, its arteries being considerably enlarged. *

The swelling and tension of inflamed parts seem to proceed from several circumstances; the dilatation of the vessels; the plethoric state of the arteries and veins; the extravasation of serum and coagulating lymph; and the interruption of absorption, as particularly noticed by the celebrated Soemmering. † That the extravasation of coagulating lymph has a remarkable share in producing the swelling of inflamed parts is unquestionable; for, it fills up all their interstices, glues their whole structure together, and consolidates them into one mass. When its quantity is considerable, it is in time often converted into a true cellular, or membranous texture, or assumes, more or less, the peculiar qualities of different organs. This is very evident in the bones. By means of such change, also, several loose parts may acquire the external properties of denser organs. Thus, the lungs are sometimes turned into a liver-like substance, a morbid alteration long since described by Morgagni, under the very expressive name of "hepatisation." ‡

With regard to the augmentation of heat in inflammation, Hunter's experiments tend to prove, that the real temperature of the part affected, as indicated by the thermometer, is much lower, than what the feelings of the patient would lead one to suppose; and he was inclined to think, that, whatever might be the temperature of an inflamed part, it never exceeded that of the blood in the heart. By artificial means, he excited inflammation in the chest of a dog, and in the abdomen, rectum, and vagina of an ass, without being able to detect any considerable rise in the temperature of those parts. In a patient, however, upon whom he operated for hydrocele,

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* Hunter on the Blood, &c. p. 280.

† De Morbis Vasorum Absorbentium, 8vo. 1795.

‡ De Sedibus et Causis Morb. Epist. An. Med. XXI. 2. 13. 17. 19. 27. Meckel, Handbuch der Pathologischen Anatomie, b. 2. abth. 2. p. 26.

the rise was much more remarkable; for, a thermometer, introduced into the tunica vaginalis immediately after the operation, indicated a temperature of only ninety-two degrees; but on being again introduced the following day, the quicksilver rose to ninety-eight and three quarters. Yet, even in this case, it was supposed, that the temperature of the inflamed parts was less, than that of the blood near the heart. * It is remarked, that parts secreting fluids, do not, in their inflamed state, cause so lively a sensation of heat, as other organs not performing a similar office: hence, a severe inflammation of the urethra, it is said, does not occasion so distressing a feeling of heat, as an inflammation of the skin. †

It is more easy to conceive, than describe, how any quick deviation from the natural state of parts must excite pain. Perhaps, it may be the unusual condition, into which the nerves are thrown, joined with an increase of sensibility in them, that is to be regarded as the cause. In chronic inflammation, the graduality of the change allows the nerves to become adapted to it, and the degree of pain only amounts to a dull uneasiness; but, in phlegmon, the change being quick, the pain is considerable. Each kind of inflammation seems to have its particular sort of pain. Thus, phlegmon excites a pain, which is joined with a sense of throbbing and heaviness; erysipelas gives rise to a pungent itching kind of pain; and anthrax causes a pain, characterized by a sensation of burning and stiffness. The throbbing is sometimes described as depending upon the strong pulsation of the arteries, which are alleged to beat in many instances with preternatural force, not merely in the seat of the inflammation, but for some way from it towards the heart. "Inflammation," says Mr. Hunter, "is not only an action of the smaller vessels in the part itself, but in the larger vessels leading to it. This is proved in whitlows, where the inflammation and throbbing pain are confined to the extremity of the finger; yet, when we grasp the finger, a strong pulsation is felt in the two arteries leading to the inflamed part, while no such pulsation can be felt in the other fingers. If the inflammation be very considerable, the artery, as high as the wrist, will be sensibly affected." ‡ The preceding fact, though not advanced by Hunter for any such purpose, is always strongly insisted upon by those authors and lecturers who inculcate the doctrine of

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* Hunter on the Blood, &c. p. 293.
† Meckel, Handbuch der Pathol. Anat. b. 2. abth. 2. p. 22.
‡ Hunter, p. 278.

the arteries contracting with increased force in inflammation, as a complete proof of their hypothesis. But this mode of accounting for the augmented throbbing of inflamed parts is not universally admitted; and an endeavour has been made to explain the thing on very different principles, as will be presently noticed. Hunter himself was far from drawing any such conclusion from the fact which he has cited; for all that he presumes to say is, that the increased throbbing, which can be felt in the inflamed part, and for some way from it, proves that the arterial system is *dilating* itself, and allowing more blood to pass than usual.

The very first act of the vessels, when the stimulus which excites inflammation is applied, is exactly similar to a blush, simply an increase or distension beyond their natural size. Afterwards a new action begins, which is probably a separation of the coagulating lymph, and the throwing of it out of the vessels.* I have already remarked, that it is this substance which chiefly causes the swelling of inflamed parts, by filling all their interstices. The observation, however, is not quite correct, inasmuch as there is generally a proportion of serum likewise effused, which is the cause of the soft, doughy, œdematous tumor often seen about an inflamed part. The serum, which is quickly effused, is capable of being absorbed with equal rapidity. Whether extravasated coagulating lymph admits also of such removal has been very recently doubted†; a circumstance, which rather surprises me, when numberless proofs of the fact are daily seen in the resolution of all external phlegmonous tumors; the cure of hernia humoralis; and the removal of nearly every kind of thickening and induration resulting from inflammation.

Although all inflammations are attended with an effusion of coagulating lymph, yet, as Meckel observes, it happens in very different degrees, and does not bear any direct proportion, but often a contrary ratio to the violence of the inflammation, the dilatation of the vessels, and the quantity of blood contained in the part affected. Frequently it first comes on chiefly towards the termination of the affection, or, at least, after the process has somewhat declined from its highest pitch, being in this respect somewhat analogous to ‡ suppuration. The form under which the coagulating lymph appears on its first effusion, Meckel represents as being the same as that of ordinary cellular membrane; while another writer[*] conjectures that it can never be fluid, because it is frequently met with upon the internal surface of inflamed veins. To Professor Meckel, however, this last idea seems not to agree very well with the original fluidity of every texture; and he adverts to the interesting experiments of Fordyce, Hewson, and Hunter, which prove that the lymph of the blood in inflammation actually coagulates more firmly than in health. Of all inflammations those of serous membranes are most disposed to extravasation of coagulating lymph, which generally produces an adhesion of their opposite surfaces. A similar effusion, however, may take place upon inflamed mucous membranes, especially those of the alimentary canal and lungs, the products of such extravasation appearing in the form of hollow or solid cylinders, corresponding to the canal in [†] shape. Mucous membranes, however, must be violently inflamed ere this kind of effusion happens from them, and in milder degrees of inflammation they usually secrete pus.

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* Hunter, p. 279.

† Parry's Elements of Pathology and Therapeutics, p. 111.

‡ See Meckel's Handbuch der Pathologischen Anatomie, b. 2. abth. 2. p. 27.

In particular cases the coagulating lymph serves as a medium, in which new vessels grow, and, in this circumstance, it is never altogether absorbed, or rather it changes into a permanent organized substance. When effused upon the surface of a recent wound, the ends of a broken bone, or an inflamed serous membrane, it is generally converted into a vascular mass, which ultimately forms a permanent bond of union in wounds and fractures, or produces those unchangeable adhesions which are so commonly found between the lungs and pleura costalis in the chest, and between the bowels and peritoneum in the abdomen. It was this most interesting process which particularly excited the attention of Mr. Hunter, who named it very appropriately the *adhesive inflammation*.

The developement of new vessels in coagulating lymph is an appearance that takes place with surprising expedition. One morning, at seven o'clock, Sir E. Home[‡] operated upon a man, who had a strangulated femoral hernia. The hernial sac was opened, and found to contain a portion of bowel six inches in length, which, on careful examination, was found quite smooth, and without any extraordinary appearance of vascularity. Nine-and-twenty hours after the operation the patient died, having had scarcely any pulse during the last five hours of his existence. On dissection the strangulated part of the bowel was found highly inflamed, its external surface soft, and covered in several places with coagulating lymph. A fine injection penetrated all these distinct portions of lymph, demonstrating in each a considerable artery, accompanied with a large vein. The coagulating lymph then had been manifestly effused after the operation; and, as from the almost lifeless state of the patient during his last five hours, we cannot suppose that any new vessels could be formed during that period, it follows, that they can be produced in a space of time less than twenty-four hours. The case also proves that such vessels inosculate with the old, or original ones.

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[*] Moor on the Process of Nature in the Healing of Wounds, p. 14. Lond. 1789.

[†] Meckel, Op. cit. b. 2. abth. 2. p. 30. See also the appearances in Croup, as delineated in Baillie's plates of Morbid Anatomy.

[‡] On the Properties of Pus, p. 41.

As Professor Meckel remarks *, other observations, however, tend to prove, that the new vessels are only extensions or continuations of the old ones. Soemmering † relates several cases in which it was demonstrated by injections, that the vessels produced in membranous adhesions in the chest, did not proceed from the lungs to the pleura, but originated from this last membrane in the situation of every intercostal artery. The thing is represented in the same way by Monro. ‡ A large membranous adhesion, which connected the intestine and peritoneum together, derived its vessels also from those of the latter membrane. Meckel conceives, however, that as these vessels often first arise entirely by themselves, it must be in a later stage that they form junctions with the old ones, so as to become a part of the general vascular system.

Hunter frequently noticed, in the centre of the extravasated substance, which connected inflamed parts, and on the surfaces after separation, small specks of red blood. These could hardly have been extravasated at the same time with the coagulating lymph; for they would then have been more diffused, plainly connected with the vessels, and not situated within the lymph. A corresponding extravasation would also have resulted from injection, which was not the case. Hence Mr. Hunter was led to conclude, that the blood was produced in the new-formed coagulum itself, exactly as, in the incubated egg, blood forms at distinct unconnected points; and Professor Meckel thinks the account is rendered more probable by the fact of the formation of blood and vessels in this new structure, going precisely through the same stages as the

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* Handbuch der Pathol. Anat. b. 2. abth. 2. p. 32.

† Transl. of Baillie's Morb. Anat. p. 32. note 67.

‡ Obs. on the Nervous System, pl. 13.

incubated egg; inasmuch as at first merely tubes for the blood can be discerned, but nothing like regular vessels.[*]

Mr. Hunter injected a thigh-stump through the femoral artery, and thus filled the mass of coagulating lymph, which lay on the surface, and which was found to be cellular, and not composed of regular vessels. But, as Meckel observes, Wolff[†] had already pointed out, what was remarked by Hunter, that in the beginning at the circumference of the embryo chicken, a circle of small specks of blood was produced, which soon changed into a vascular structure; though the sides of this new texture were not different from the substance in its circumference. Nay, says Meckel, the immortal Harvey proved, in opposition to former tenets, that the blood must be the first formed part, as the vessels only serve for its circulation.[‡] Meckel thinks it probable, that, in certain states of inflammation, contractile cavities, which communicate together, are first formed in the coagulating lymph, the blood running through them in no determinate direction, as in the lower animals; but that they afterwards change into true vessels, which at length anastomose with the old ones.

The form of the new vessels is said to be very simple. In all the instances, in which Meckel examined those between the pleura and ribs, he found them quite straight, even when nearly an inch in length. He describes them as having sometimes ramifications only at their two extremities, so as to resemble in miniature the vena portarum system; or a distinct new system of vessels, with a middle trunk, and no heart. The new vessels, he says, usually lie very close together, and the ramifications at each end probably soon disappear after the establishment of anastomoses between the old and new vessels.[§]

Whatever may be the situation of inflammation, it is always most violent on the side nearest to the external surface of the body. This very curious fact, which was first pointed out by Mr. Hunter, is so constant, that it may be regarded as a sort of law in the animal economy.

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[*] B. 2. abth. 2. p. 33.

[†] Wolff, De Generatione, Hal. 1759. p. 197.

[‡] Harveius, De Generat. p. 64. 190. 256.

[§] See Meckel's Handbuch der Pathologischen Anatomie, b. 2. abth. 2. p. 33—35.

CAUSES OF INFLAMMATION.

The causes of inflammation are divided into the *remote* and *proximate*; but the terms are not very correctly applied. The epithet *remote* is badly chosen; for it comprehends many things which contribute immediately, as well as remotely, to the production of inflammation. In most instances, we are able to trace the origin of this process to causes, which act either directly upon the part affected, or indirectly upon it through the medium of those inexplicable sympathies, which connect distant parts of the body with one another. As illustrations of the latter remark, Professor Thomson, of Edinburgh, adverts to the effects of particular kinds of food, and of small doses of mercury, or arsenic, which, after being taken into the stomach, sometimes produce distinct and specific inflammations of the cutaneous texture. The exposure of the feet to cold, he also observes, occasions in one person an inflammation of the throat; in another, an inflammation of the chest; and, in a third, an inflammation of the * belly. The expression, *exciting* causes, which is sometimes employed, appears much more appropriate than the term *remote*. These remote or exciting causes of inflammation are very numerous; but, as they mostly admit of being referred to external violence or irritation, from mechanical or chemical means, a full detail of them would be superfluous. Suffice it to say, then, that wounds, fractures, contusions; the lodgment of a thorn, bit of glass, or other extraneous bodies in the flesh; a scald, or burn; exposure to cold; and the application of innumerable irritating substances to parts; are common exciting causes of inflammation. Fevers often appear to have a similar effect. The hypothesis, however, that the inflammation thus occasioned is critical, or conducive to the relief of the constitutional indisposition, stands upon no better foundation, than conjecture. Sometimes inflammation arises spontaneously, or (to speak more correctly), no perceptible cause can be assigned for it.

By the term *proximate* cause, pathologists generally imply that state of the part affected, upon which the phenomena peculiar to inflammation immediately and primarily depend. They mean, in fact, that mysterious change, that secret process, that first essential action in the part, which constitutes the very beginning of inflammation, keeps up its progress, and is inseparably connected with its existence. In customary language, it is that without which the disease cannot exist, and which existing, the disease must also *exist. As this last definition, however, conveys no useful information, it might as well be suppressed, for, according to it, the proximate cause is only another name for the process itself, from which, as Professor Thomson observes, it neither can nor need be distinguished. "In such an explanation," says Dr. C. H. Parry, "the proximate cause is, strictly speaking, a part of the disease, which implies the absurdity, that a thing is the cause of itself. The very name, *causa proxima*, or that which is nearest to any thing, shews that it cannot form a part of that thing, unless we admit that a thing can be at the same time a part of another, and not a part of it. Causation, according to all our conceptions respecting it, implies not only difference and separation, but also priority." This ingenious author, therefore, prefers defining a proximate cause to be "that phenomenon in the body, or part immediately preceding the state which we call disease, without which previous phenomenon, the disease is not known to exist." †

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* Lectures on Inflammation, p. 50, 51.

The subject, it must be confessed, has been one of much unsuccessful disquisition. While Galen and Boerhaave ascribe the proximate cause of inflammation to particular states of the blood and humours, Stahl, Gorter, Hunter, and Cullen, all concur in imputing it rather to an affection of the vessels. If the state of the whole mass of the blood were the cause, why should inflammation be confined to any particular part? It is a general opinion, that a larger quantity of blood is determined to an inflamed part, than passes to it in the natural state. ‡ And, certainly, if an incision be made into it, the blood gushes out more profusely and vehemently than from a cut in a similar part free from inflammation. Now, although this does not completely prove, that there was actually an accelerated flow of blood through the inflamed part previously to the incision, it is a phenomenon which cannot arise from any peculiarity in the action of the heart; an organ, which drives the blood equally into the whole arterial system. The fact must be referred either to the augmented diameter of the vessels of the part affected, or to the peculiar property of the arteries, which, in the healthy state, at least, are not simple mechanical tubes for the transmission of the blood, but active instruments in the promotion of the circulation, possessing, besides their elasticity, a vital power of action, arising from their muscular structure.

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* Pearson's Principles of Surgery, p. 25. edit. 2.

† Parry's Elements of Pathology and Therapeutics, vol. i. p. 89—91.

‡ Mr. Hunter every where expresses his belief, that the blood circulates in greater quantity, and with increased velocity, through inflamed parts.

We have mentioned the dilatation of the small vessels, as one of the earliest perceptible changes in the process of inflammation. Several lecturers, I observe, do not describe the dilated state of the small arteries of an inflamed part as regular and permanent, but as joined with alternate, proportionately increased contractions. No doubt, this notion of the nature of the increased action in inflammation is derived, partly from the throbbing in phlegmonous swellings, and partly from the recollection of the natural systole and diastole of the arteries in the healthy state, a fact, of which there could be no rational doubt, even were the opinion not sanctioned by the majority of the most celebrated modern physiologists. But these alternate increased dilatations and contractions of the small arteries of an inflamed part, have never yet been proved either by experiment or * observation. Professor Thomson and Dr. Parry could see no such motions in the small arteries, which were microscopically examined in their experiments relative to inflammation, and Mr. Hunter is so far from countenancing this supposition, that he gives a decided opinion, "that in inflammations the muscular coats of the arteries dó not contract." † When, therefore, this distinguished surgeon speaks of inflammation being an increased action of the vessels, he does not imply that such action consists both in increased dilatations and contractions, alternately performed. The dilatation of the vessels of an inflamed part is a subject on which he displays a great deal of interesting reasoning. The muscular power of the arteries seems to him to give way in inflammation, because they are more dilated than their natural elasticity would allow, which must also be increased. He conceives, that this change is something more than simply a common relaxation; "we must," he says, "suppose it an action in the parts to produce an increase of size for particular purposes," and this he would call the "action of dilatation." He compares it with the increase of the size of the uterus in pregnancy, with the enlargement of the os tincæ in the time of labour; the consequence of the preceding actions, and necessary for the completion of those which are to follow. ‡

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* Thomson's Lectures on Inflammation, p. 75.

† On the Blood, &c. p. 285.

‡ Op. cit. p. 282.

Dr. Wilson Philip has expressed a suspicion, that the exposure of the vessels to the air, in the cases instanced by Dr. Parry, might have excited a permament contraction of them, and hindered the observation of that alternate contraction and dilatation, which seem so sensible to the finger, through their natural coverings.* On this point, it may be remarked, however, that Dr. Thomson's experiments and observations were made on the thin diaphanous parts of the feet of frogs, and the vessels were not stripped of their ordinary coverings, but inspected in their natural situation. They were also uniformly enlarged, and not permanently contracted. Nor are the minute arteries of the inflamed tunica conjunctiva and cornea, which are so distinctly visible, preternaturally exposed, and yet nothing like alternate dilatations and contractions of them can be discerned. If, therefore, we are to understand, by an increased action of the vessels, both an alternate increased contraction and dilatation of them, we are at present unprovided with any facts, which allow us to assert, that the minute capillary arteries are so affected. On the contrary, all the evidence, which we possess on the subject, tends to prove, that at all events such vessels are permanently dilated.

But, although the minute arteries of an inflamed part may not both expand and contract in a preternatural degree, but regularly continue of one diameter, it may be conceived, that the larger arteries in the seat of inflammation, as well as those leading to it, may be so affected. This supposition, however, has not hitherto been proved; and every reflection, which I have been able to make, inclines me to account for the throbbing in the part, and in the arterial trunks leading to the seat of inflammation, on another principle, presently to be noticed. I impute also the augmented quantity of blood in the part chiefly to the enlarged state of its arteries, though, of course, when the whole system is affected with symptomatic fever, the increased action of the heart and arteries in general will tend to make the blood circulate with augmented velocity in the inflamed, as well as other, parts of the body.

That every endeavour to explain the proximate cause of inflammation upon any principle hitherto suggested is not free from objections, must be acknowledged; for, there must be something besides merely an increased action of the vessels; there must be something besides an enlargement of their diameters to constitute inflammation. Both these changes happen to the external carotids in the growth of the stag's horns; to the spermatic arteries of animals, which copulate only at certain seasons of the year; and to the arteries of the uterus in pregnancy. Such changes probably always happen, whenever there is any process going on in the animal economy requiring an extraordinary supply of blood [*]: still, in the instances now mentioned, there is no inflammation; no pain; no increased heat; no symptomatic fever. A simple inequality in the distribution of the blood, therefore, uncombined with other causes, cannot account for the origin of inflammation.

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* Lond. Med. Repository, vol. vi. p. 55.

A very opposite theory to that, which prevails in the schools of medicine in this country, was entertained by the Italian physician, Vacca [†], Mr. Allen, of Edinburgh, &c. They supposed the action of the vessels of every inflamed part to be diminished; and that there actually existed in it a congestion of blood, proved by the increase of bulk and redness of the small arteries, and by the increased flow of blood, when an inflamed part was divided. One peculiarity in Mr. Allen's doctrine consisted in the assertion, that the vessels, which are the actual seat of inflammation, contract with less force, than the vessels nearer the heart, from which they receive their supply of blood.

As Dr. Thomson well observes, however, there are in all these different hypotheses certain points of agreement, as well as of variance. Each admits, that inflammation has its seat in the capillary vessels; that the redness is owing to the unusual quantity of blood in the vessels of the inflamed part; and consequently, that the capillary arteries are much dilated.

The sense of throbbing, Mr. Allen, Callisen, &c. attribute to the difficulty, which the blood meets with in passing from the arterial trunk into the capillary branches [‡]; and the former considers it, as no criterion of the force, with which the artery contracts, since it is produced during the diastole of the vessel, and by a power foreign to the artery itself.

Attempts have been made to support the doctrine of the diminished action of the inflamed vessels by an appeal to experiment, and Dr. Philip Wilson, and Mr. Boraston, undertook some investigations, from which it was concluded, that, in the arteries of inflamed parts, the circulation is slower, than in those of uninflamed parts.* Professor Thomson also instituted experiments, for the purpose of settling this disputed point, and he infers, that inflammation is sometimes attended with an accelerated, and sometimes with a retarded circulation through the capillary vessels of the inflamed part; consequently, that neither of these changes ought to be included in a definition of the process.†

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[*] Hunter, p. 288.

[†] Liber de inflammationis morbosæ, quæ in humano corpore fit, natura, causis, effectibus, et curatione. Flor. 1765.

[‡] Arteriæ minores pressione sanguinis irruentis calidioris dilatatæ atque elongatæ, in ductos serpentarios flecti, et sanguinem prementem ægre promovere videntur, non in ipsa parte adfecta solum, sed in vasis circumjectis quoque; inde pulsatio in parte inflammata. (Callisen, t. 1. p. 191.)

Another interesting writer, however, whose facts and reasonings are well deserving of attention, considers the excessive momentum of the blood as an indispensable cause of what we see of inflammation, whatever may have been the more remote causes, or other invisible intermediate circumstances in the constitution, antecedently to such excessive momentum. Nor will he allow, that the conclusion is invalidated, were it even proved, according to the opinion of Dr. P. Wilson, that the velocity of the blood in the vessels of an inflamed part is diminished, unless it be also proved, that the velocity is lessened in a greater proportion, than the quantity is increased.‡ But, Dr. P. Wilson himself regards this last fact as also proved, because, in the experiments which he made, the blood was observed to move more and more slowly, till in the more inflamed parts, it ceased to move altogether. His experiments also tend to prove, that the blood is moved in the capillaries by the power of these vessels themselves, and, consequently, he argues, that, if they are debilitated, the momentum of the whole blood in the part, as well as its velocity, must be less than in health.§

Amidst all these jarring opinions, it is difficult to come to any settled conclusion about the state of the circulation in the capillary secerning vessels, from which the coagulating lymph and serum are thrown out. But, we are to remember, that the arteries have also other extremities, by which they communicate with the veins; and that the veins, as well as these small arteries, which run into them, are increased in size. This very change is itself a strong argument in favour of the opinion, entertained by Hunter and the greater part of the moderns, that the blood circulates through an inflamed part with increased velocity, and in a greater quantity, than natural. If the arteries were simply loaded with blood, which could not readily pass into the veins, surely these latter vessels would not be enlarged. And, with respect to the increased action of the vessels in inflammation, I understand by the expression the spontaneous augmentation of their diameter, the throwing out of coagulating lymph, serum, &c. and by no means an alternate expansion and contraction of them in a greater degree than natural. We know of no power, by which any set of arteries could be thus momentarily and repeatedly expanded in a proportion beyond what happens in the rest of the arterial system; and, as for the more forcible contraction, I see much reason for thinking with Hunter, that the thing cannot occur, because the muscular coat of the vessels in inflammation appears to be weakened.

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* Wilson on Febrile Diseases, part 2. Callisen also expresses a similar belief: " Neque tamen ideo obstructio sanguinisve stagnatio adest in arteriis sic adfectis: quem certe propulsant atque transmittunt in venas respondentes, licet non satis expedite, nec integra quantitate accepta." Syst. Chir. Hod. Pars 1. p. 191.

† Lectures on Inflammation, p. 75, &c.

‡ Parry's Elements of Pathology, p. 84.

§ London Medical Repository, vol. vi. p. 56.

TREATMENT OF PHLEGMONOUS INFLAMMATION.

The first object in the treatment naturally consists in removing the causes, which have excited the disorder. If the irritation of a splinter were to give rise to phlegmonous inflammation, who would not of his own accord extract the offending substance? But, the removal of the stimulus producing inflammation will not always put an immediate stop to it; for, the living parts have been injured, and this process is necessary for their reparation. In this point of view, it can only be regarded as hurtful, when its violence and intensity are likely to prevent the accomplishment of the salutary ends, for which it generally commences.

In whatever manner the several differences, respecting the nature of inflammation, may be hereafter reconciled, it will always be a primary indication to diminish the quantity of blood in the part by bleeding. *General bleeding*, however, by which we are to understand the extraction of blood from a largish vessel at a distance from the inflamed part, is sometimes less advisable, than *topical bleeding*, or the taking away of blood from the inflamed part itself, or its vicinity, by means of leeches, cupping, &c. The nearer the place of bleeding is to the seat of inflammation, the more efficacious is the evacuation, and the less the occasion for taking away such a quantity, as would be followed by a serious weakness of the whole constitution. In all cases of urgency and importance, however, general bleeding is indispensable; and, in many instances, the surgeon is obliged to employ venesection, or arteriotomy, not merely once, but repeatedly, in conjunction with leeches and cupping. The necessity of such practice is often exemplified in wounds of the head, chest, and abdomen; and in cases of inflammation within either of those cavities; or affecting any of the large joints; or so delicate an organ as the eye, whose functions would be entirely destroyed by suppuration.

The efficacy of bleeding is greater, the sooner it is practised, and the more suddenly the blood is evacuated. Hence, the utility of sometimes making the opening in the vein large, especially in cases, where the patient's safety absolutely depends upon an immediate stop being put to the inflammation. The fainting, which is frequently produced in this manner, causes a temporary and an immediate suspension of every operation in the system, and, amongst others, of the process of inflammation.

Topical bleeding can only prove powerfully efficacious, when general plethora has been previously removed; but, if no plethora, and not much fever exist, it may have immense effect; and, as Dr. Thomson truly remarks, whenever any doubt arises, with regard to the propriety of venesection, it may be laid down, as a common rule, that it is safer to employ local, than general bleeding.*

Whenever general bleeding is requisite, the quantity of blood to be taken away must depend upon the united consideration of the organ affected, the severity and urgency of the symptoms, the strength and age of the patient, the state of the pulse, and the appearance of the blood itself, in relation to the buffy coat. In such cases, as injuries of the brain, and wounds of the lungs, the patient's sole chance of recovery often depends upon the boldest use of the lancet; and, in the records of surgery, many instances are to be found, in which life seems to have been saved by the sacrifice of two or three hundred ounces of blood in the short space of a few days.

Mild purgatives of the saline kind not only diminish the quantity of circulating blood, by the increased secretion which they occasion in the alimentary canal, they also operate specifically, in lowering all the operations of the system, and must therefore tend to subdue inflammation. As they have not so debilitating an effect as bleeding, they are seldom omitted, even when the evacuation of blood is judged dispensable. The most eligible of these medicines are the sulphates of soda and magnesia, the phosphate of soda, or the supertartrite of potassa. As drastic purgatives mostly produce irritation, they are not prescribed in ordinary cases of inflammation. But the submuriate of mercury is not unfrequently employed, particularly in children, who cannot be made to take more nauseous medicines, and in other subjects, whose chylopoietic organs appear to be disordered. In cases of the last description, an emetic will often do infinite good.

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* Thomson's Lectures on Inflammation, p. 170.

When mildly aperient medicines fail in removing costiveness, their action should always be assisted with laxative clysters. Indeed, there are some cases of inflammation within the abdomen, where the surgeon is sometimes afraid of prescribing the mildest purgative, not even the oleum ricini, and then clysters are a valuable resource.

The employment of nauseating doses of the tartrite of antimony proves advantageous in two ways; it relieves that oppressive dryness of the skin which accompanies the fever attendant on severe local inflammation; it diminishes the increased action of the heart and arteries in general. Whenever nausea is produced, the whole constitution sympathizes with the stomach so intimately, that it is immediately thrown into a temporary state of debility, every considerable operation in the system becoming lowered, and, amongst others, the process of inflammation. When there is particularly urgent reason for putting a sudden check to inflammation, this use of antimonials ought never to be neglected, as in inflammation of the brain and its membranes, arising in consequence of external violence; inflammation of the larynx, various forms of acute ophthalmy, &c. On a similar principle, digitalis is also sometimes prescribed, though its operation is less unequivocal[*] and expeditions, than that of tartarized antimony.

The practitioners of this country considering opium as a strong stimulant, seldom employ it in cases of phlegmonous inflammation, except when the pain is extremely severe. Given at an early period, in acute inflammatory diseases, it never fails to excite vascular action, and to aggravate all the symptoms of fever. Therefore, says Dr. Thomson, it is not to be used unless to allay the pain and irritation arising from a chirurgical operation, or from the recent infliction of an external injury; and he thinks, that it should be generally omitted even after a surgical operation, except when the patient is very nervous, and complains of much [*] pain. Professor Richter, of Göttingen, was a great advocate for the exhibition of opium in cases of inflammation. He recommended this practice to be adopted as soon as the patient had been bled and purged. He combined the opium with antimony, camphor, the submuriate of mercury, or ipecacuanha, according to circumstances; and he thought that the dose of opium should be rather large, since he found that small quantities always rather increased, instead of diminishing, the restlessness, heat, and other febrile symptoms. [†] In this country, however, the faith in the utility of opium for the relief of the effects of phlegmonous inflammation is much more moderate, the exhibition of the medicine being restricted to the instances above specified, and a few others, in which the pain is very severe, like certain cases of whitlow, and some other acute abscesses.

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[*] It will be seen in the chapter on hectic fever, that, by means of foxglove, the pulse may be reduced from 120 to 50. Its operation, however, is uncertain. Orfila even doubts, whether it always diminishes the action of the heart and arteries; and he states, that he has taken xx gr. of the powder every day for a month, without perceiving any such effect. See his Traité des Poisons, tirés des Règnes Minéral, Végetal, et Animal; ou Toxicologie Générale, tom. ii. Paris, 1815.

The patient should abstain from fermented and spirituous liquors, and animal food. In cases, however, which are not of much importance, light broths may be taken, but, in all other examples, the patient should be entirely restricted to vegetable diet, gruels, slops, tea, dry toast, &c. Even milk, as partaking of an animal nature, is generally improper in the beginning of any considerable inflammation. Diluent, acidulated drinks may be taken with freedom, such as lemonade, capillaire and water, barley-water, &c. Sweet acid fruits, and common saline draughts are also useful in quenching thirst, and keeping the bowels open. But, above all things, quietude is to be enjoined, and the patient is to be strictly kept away from any noise, or objects which would agitate or disturb him. His chamber ought to be temperately cool, and he should not be covered with too much clothing; for, whatever tends to heat him, and hurry his circulation, cannot fail to be hurtful.

Heat naturally promotes all actions which are taking place on the animal economy, and hence it must have a bad effect on all such inflammations as are disposed to rise above that degree, which is actually necessary for the restoration of the parts to the state of health. It is therefore a common indication, to diminish the temperature of inflamed parts, by covering them with cold applications, and keeping up from their surface a continual evaporation. The lotions employed for this purpose, are commonly of an astringent and a sedative nature. As the acetite of lead possesses both these qualities, a solution of it, well known by the name of the saturnine lotion, or Goulard, is most frequently used. Such surgeons as are fearful of the deleterious effects which have been known to arise from the absorption of lead, make use of simple cold water, or of a solution of ʒj. of the sulphate of zinc in ℔j. of water. Linen, kept constantly wet with these lotions, is to be applied to the part affected.

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[*] Lectures on Inflammation, p. 72.

[†] Anfangsgr. der Wundarzn, b. i. p. 26. Göttingen, 1799.

I have mentioned, that, in inflamed parts, the function of absorption seems to be more or less interrupted. Hence, we may discern a reason for the great and decided benefit resulting from the employment of what are called discutient lotions, in all cases where the extravasation of blood, and coagulating lymph, is considerable. In the inflammation following contusions, concussions, and sprains, discutient applications are frequently the best which can be employed. A very excellent discutient lotion, is that prescribed at St. Bartholomew's Hospital: ℞ Ammon. muriatæ ℥ss., aceti et spirit. vini rectif. sing. ℔j. M. Another very good one is composed of the liquor ammoniæ acet. alone, or mixed with equal parts of spirit of wine, and distilled water. When the inflammation is slight, and the swelling and extravasation great, the surgeon may sometimes venture to use liniments; but, before doing so, he must be sure that the part will bear the friction without any ill consequence.

The fact is curious, but perfectly confirmed by experience, that inflammation is sometimes most benefited by cold applications, and sometimes by warm emollient poultices and fomentations. Although in the early stage of the greater number of external phlegmonous inflammations, cold astringent lotions are preferable to warm applications, it is occasionally otherwise, and either from singularity of the patient's constitution, or, in consequence of the structure, situation, and nature of the inflamed part, they do not produce their usual good effect. An inflamed testicle, and the incipient stage of acute ophthalmy, generally receive more benefit from emollient fomentations and poultices than from cold astringents. Inflammations, not admitting of a cure without suppuration, should also be treated with emollients; for the sooner the matter is formed the sooner the inflammation will end. Such is the inflammation caused by fevers, contused wounds, boils, and carbuncles.

The best emollient poultice is that made of linseed meal.

It is made by gradually mixing the powder with hot water, until the consistence is such as it ought to be. A little oil is often added, which prevents the application from drying and becoming hard.

A very good emollient fomentation is that used at St. Bartholomew's Hospital: ℞ lini contusi ℥j. chamœmeli ʒij. aquæ distil. ℔vj. paulisper coque et cola. When the pain is exceedingly severe, the following fomentation, in use at Guy's Hospital, often produces great relief: ℞ papaveris albi exsiccati ʒiv. aquæ puræ ℔vj. coque usque remaneant ℔ij. et cola.

Inflammation has three different terminations; or, to speak more correctly, after this process has continued a certain time, it either subsides entirely, induces a disposition in the vessels to form pus, or completely destroys the vitality of the part.

Ulceration is also an effect sometimes directly produced by phlegmonous inflammation; but it more frequently does not commence till suppuration has rendered it necessary.

The most common way, in which inflammation ends, consists in a gradual abatement of the pain, redness, swelling, throbbing, and heat of the part, without any formation of matter, or permanent injury of structure. This is termed *resolution*, and is the best manner, in which inflammation can possibly end.

The next most frequent termination of phlegmon is in the production of pus, termed *suppuration*; a state in which there is rather a modification of the increased action, than a cessation of it.

The other manner, in which inflammation ends, is in the death of the part affected. This is the worst, but, happily, the least frequent result of common inflammation.

Every part, just recovered from the violence of phlegmonous and other kinds of inflammation, may be regarded as still imperfect, and, sometimes, in consequence of the loss of tone, induced in the vessels, a languid or chronic inflammation succeeds, which it is very difficult to overcome. Hence, however improper stimulants, astringents, and corroborants may be, as local applications, during the violence of inflammation in very sensible organs, they are generally highly proper the moment that stage ceases. Thus, emollients, which for the first day or two are serviceable in acute ophthalmy, afterwards act prejudicially, in consequence of their relaxing nature.

CHAP. II.

OF THE SYMPATHETIC, OR SYMPTOMATIC, INFLAMMATORY FEVER.

AFTER being informed that the mass of circulating blood becomes affected in cases of inflammation, we must expect to find traces of constitutional, as well as of local disturbance. I have indeed already repeatedly mentioned the fever attendant on inflammation, and some particular account of it is now proper. Its name is derived from its being, as it were, one of the symptoms or effects of the local disorder, and the sympathy of the whole constitution, with the disturbed state of a part. It is called inflammatory, because it is accompanied with an increased action of the heart and arteries, and with what is termed a *phlogistic* type. The symptoms are, a frequent, strong, and full pulse; headach; loss of appetite; nausea, and sometimes vomiting; constipation; an increase of the temperature of the whole body; a hot dry state of the skin; dry furred tongue; great thirst; universal disturbance of the nervous system; restlessness; anxiety; loss of appetite and sleep; and, in some cases, delirium. As Professor Thomson observes, perspiration is not the only secretion which is diminished. There is great reason to believe, that all the other secretions of the body are similarly affected. For instance, the flow of saliva into the mouth is diminished, and ulcers and other surfaces secreting pus are dried up upon an attack of fever. The urine is not only diminished in quantity, its chemical properties appear to undergo considerable alterations. Though of a high colour, it deposits upon standing no lateritious sediment, or uric acid, as the red powder of the urine is now termed; a thing which it almost constantly does the moment the fever begins to abate.* The impediment to the various secretions into the alimentary canal may also account for the constipation, which is a usual symptom.

Such is the general nature of the febrile symptoms, when any considerable degree of phlegmonous inflammation affects common parts, like the integuments; the disturbance of the system being in a great measure proportioned to the extent and violence of the local affection.

The effects of inflammation on the constitution, however, are not simply in a ratio to the extent of the local affection; for, they are influenced as much by the nature of the parts, in which it is situated, as by its quantity.

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* See Thomson's Lectures, p. 115.

When muscles, cellular membrane, skin, &c. are inflamed, the pulse is, as we have described, strong and full. These may be said to be common structures.

If the inflammation be in tendinous, ligamentous, or bony parts, the stomach sympathizes more than when muscles, &c. are inflamed. The pulse is quicker, but has not so much fulness, and the blood, not being propelled so far into the small vessels, forsakes the skin.

When inflammation is in vital parts, or such as sympathize with the stomach, there is great depression blended with the constitutional symptoms, the pulse is frequent and small, and the blood is not pushed into the minute vessels. A very remarkable depression of strength very frequently attends an inflammation of the intestines, and the pulse is small and hard; whereas, when the surface of the body is the seat of the affection, there is often a temporary augmentation of tone, with a full, strong, and hard pulse. In fact, when the peritoneum and intestines are inflamed, the patient frequently seems so reduced, and his pulse so small, that the surgeon is afraid to use the lancet. Perhaps, however, he at length ventures to do so; the blood appears exceedingly sizy, and the pulse gains strength, in proportion as the disease is benefited by the evacuation.

It is rather a curious fact, remarked by Mr. Hunter, that all inflammations of parts, which derive their nerves from the great sympathetic nerve, occasion an unusual lowness of spirits.

When the constitution is good, and parts not very essential to life are inflamed, the pulse becomes increased in strength and fulness. When the same parts are affected in weak irritable persons, and in women who lead sedentary lives, the pulse is quick, hard, and small, at the commencement of the inflammation, just as if vital parts were concerned.

Thus we see, that all the varieties of inflammatory fever depend chiefly on four circumstances; viz. the extent of the inflammation; the structure of the parts affected; their functions; and the nature of the constitution.*

If continued beyond a certain period, the common inflammatory fever always has a tendency to change into *hectic;* a species of constitutional disorder described in a future chapter, and invariably attending all long-continued profuse suppurations, as well as every other surgical disease, which keeps up for a considerable time a general disturbance of the health.

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* Hunter on the Blood, &c. p. 322.

TREATMENT OF INFLAMMATORY FEVER.

As the cause of the sympathetic inflammatory fever is the local inflammation, it is obvious, that while we are endeavouring to cure the latter, we are taking the most effectual steps for the relief of the constitutional disorder. But, as excessive febrile disturbance may, in its turn, have a bad effect on the local complaint, it is sometimes proper to endeavour to palliate the constitutional symptoms, by having recourse to such means as would not be necessary, were the inflammation not likely to be aggravated by the fever.

The frequency, strength, and fulness of the pulse are to be diminished by the use of the lancet, the exhibition of saline purgatives, the nitrate of potassa, and, in urgent cases, by nauseating doses of tartarized antimony, or the exhibition of digitalis. Several of these remedies, however, are generally employed rather on account of the particular state and situation of the inflammation, than the degree of fever. Bleeding, for instance, is hardly ever necessary on account of the fever itself; consequently it is not usual to pursue this practice with the view of altering the state of the pulse, except where the local inflammation is important by reason of its extent, or situation; and where the increased action of the whole sanguiferous system might seriously exasperate the local mischief. Here, also, we should probably use the lancet, on account of the inflammation, were it possible to have at the same time a fever ever so inconsiderable. In short, if the inflammation does not require bleeding, it is difficult to suppose the evacuation necessary for the fever, which invariably subsides with the local disturbance. The diminished secretions are to be promoted, and a gentle diaphoresis in particular ought to be excited. For these purposes, the preparations of antimony are so superior to all other medicines, that it is scarcely necessary here to remind the reader of their excellence. The cure and treatment of this fever are, on the whole, so blended with those of the inflammation, from which it originates, that what has been said in the foregoing chapter makes it quite superfluous to enlarge the present.

CHAP. III.

SUPPURATION.

SUPPURATION is that process, by which pus, or the matter of sores and abscesses is formed; and the word *abscess* signifies nothing more than a collection of purulent matter. Like inflammation, suppuration may be either *acute*, or *chronic; simple*, or *complicated* with some specific morbid action. Thus, we see acute suppurations exemplified in common whitlows; in milk-abscesses; and many gun-shot wounds, and compound fractures; while chronic suppurations are illustrated in that frequent and serious form of disease, the lumbar abscess, and in several of the effects of scrophula. Abscesses of the scrophulous kind afford us also striking instances of what may be called chronic suppurations, complicated with specific morbid action, just as true venereal buboes present us with specimens of acute abscesses, complicated also with specific disease. At present, my observations will be confined to the simple, acute form of suppuration, arising from phlegmonous inflammation.

SYMPTOMS OF SUPPURATION.

When, notwithstanding the foregoing treatment, the inflammation becomes attended with more severe pain, a much harder tumefaction, and a conical prominence in its centre, suppuration is likely to ensue. Sometimes this event may from the first be prognosticated; because there are inflammations, which, from their peculiar nature, necessarily terminate in suppuration. The boil and carbuncle are instances of this kind; and, according to several authors, so is the inflammation induced by fevers, and often termed *critical.*

When the patient is seized with reiterated shiverings; when the fever, and all the symptoms of inflammation suddenly diminish, without any perceptible reason; when the patient experiences a heavy, cold, dull uneasiness, instead of acute pain, in the part affected; when the most elevated point of the tumor appears soft and white, while the rest has its redness increased; and when, at the same time, the surgeon can feel a fluctuation, matter is undoubtedly already formed.

The latter symptoms only occur, when the matter is superficially situated. In other cases, the quick subsidence of all the inflammatory symptoms, the repeated rigors, and the sense of weight and coldness, only afford grounds for suspecting that matter is formed. This suspicion, however, is afterwards strengthened by the patient having nocturnal sweats, with emaciation and other hectic symptoms. Also, an œdematous swelling, at first not very extensive, takes place over the situation of the abscess, and afterwards spreads, so as sometimes to extend over a whole limb. These circumstances leave no doubt of there being a hidden collection of matter. A man, endued with great nicety of touch, can often feel the undulation of matter, even when deeply lodged.

THEORY OF SUPPURATION.

The exposure of the internal surfaces and structure of the body, continued for a certain time, necessarily occasions suppuration. Here the influence of the air is not the cause; for, were a wound to be made into a cavity naturally closed, pus would be formed, after a certain time, even in a vacuum. When matter forms in circumscribed cavities without a wound, the air cannot be suspected as a cause: nor does the air, in emphysematous cases, excite suppuration.

The sympathetic fever, attendant on inflammation, has been considered an essential step to suppuration; but with little foundation. Is there not a regular secretion of pus from the most indolent ulcers? Is there not the same process on every blistered surface? In such cases, is there not oftentimes a total absence of fever?

That dead animal matter cannot be converted into pus, is proved by sloughs of the cellular membrane, tendons, fasciæ, &c. &c. remaining unchanged in abscesses a considerable time, and by dead bone lying unaltered in pus for many months. Whatever diminution of these substances may happen under such circumstances, occurs only on that side which is next to the living solids, and it can be satisfactorily accounted for on the principle of absorption.

The idea, that fermentation contributes to the formation of pus, is quite destitute of foundation. The discharge of pus from secreting surfaces, without any loss of substance; the stationary state of many abscesses; the backwardness of matter to become putrid, while unexposed to the air; sufficiently evince, that no fermenting power is present.

The opinion that extravasated blood can in time be converted into pus, is equally erroneous. *

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* A complete and masterly refutation of all these hypotheses is contained in Hunter's Treatise on the Blood, &c. p. 417. et seq.

When suppuration is about to take place in the cellular substance, or membranes of circumscribed cavities, the vessels are supposed to alter their mode of action, so as to secrete pus. This change happens gradually. Hence, pus and coagulating lymph are often found blended together in the same abscess.

The fact, that pus may be formed without a breach of the solids, or dissolution of parts, seems to have attracted the notice of several eminent men about the middle of the last century, especially Dr. W. Hunter, De Haen *, Quesnay †, Peyronie, and Morgagni. It was in the year 1749 or 1750, that Dr. W. Hunter was first struck with the thing in the dissection of a subject who had died of empyema; and M. Quesnay inserted in one of the early Memoirs of the French Academy of Surgery, a case which fell under the observation of Peyronie, in which a very copious suppuration of the brain took place. The patient died, and the head was examined, when the proportion of brain wanting was so trivial, compared with the quantity of pus that had been discharged, that it was justly concluded the matter had not been formed from the solids, but from the fluids, of the part. ‡

The modern doctrine of suppuration is, that the pus is separated from the blood by the inexplicable operation of the secerning arteries, just as ordinary secretion takes place; and that the peculiar mode of action in the arteries, is the reason why pus should be separated from the circulation, rather than coagulating lymph, mucus, &c. It is further believed, that the solids never suffer any dissolution, so as to enter into the composition of pus; and that the deficiency frequently apparent in them arises from absorption. The arteries, in producing pus, a fluid so dissimilar from blood, and of which, at least, it is to be considered as a new combination, seem to assume all the power of glandular secretion. §

QUALITIES OF PUS.

The kind of fluid which is discharged from healing sores, or phlegmonous abscesses, receives the name of *healthy* pus;

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* Ratio Medendi, Vindob. 1750.

† Traité de la Suppuration, Paris, 1749.

‡ Mém. de l'Acad. de Chir. t. 2. p. 165. edit. in 12mo.

§ According to Professor Thomson, this comparison of suppuration with secretion was first suggested by Simpson, in his Dissertationes de Re Medica, in 1722; it was afterwards taught by De Haen, in 1756; was more fully explained by Morgan in his Puopoieses, in 1763; and was the doctrine adopted by Hewson, Brugmans, Mr. John Hunter, &c.

and, in this state, it has the following properties: it is of a yellowish colour; has little smell; is void of acrimony; of the consistence of cream; and when microscopically examined, exhibits white globules * in a transparent fluid. These globules swim in a fluid which we should at first suppose to be the serum of the blood; for, like the serum, it is coagulated by heat, though not by the gastric juice of animals in the manner of milk. It is probable, that it contains a small quantity of coagulating lymph, since pus in part coagulates after being discharged from the vessels which secrete it. But although the colourless fluid, in which the globules swim, is thus far similar to serum; yet, in other respects it is different; and, according to the observations of Mr. Hunter, it differs from every other animal secretion, in being coagulable by a solution of the muriate of ammonia.† Dr. G. Pearson has found, however, that this test will not answer in the examination of matter expectorated from the lungs. The same author suspects also, that the globules of pus are composed of the red particles of the blood; an opinion, to which another intelligent physician appears to incline, when he says, that the magnitude of the globules of pus, as ascertained by the most accurate tests, is not sensibly different from that of the corpuscles of the blood, reduced to a round form by the addition of water, or otherwise; while the globules found in other animal fluids, for instance, in milk, are of totally different dimensions.‡ Pus sinks in water, and will not readily unite with it: at least, in the common temperature of the atmosphere, it will not mix with it, but falls to the bottom. While, however, some writers assert, that, if it be kept in a considerable degree of heat, it will rise and diffuse itself through the water, and remain mixed with it, after becoming cool, the globules being decomposed; others affirm, that it cannot be dissolved in water, even at a boiling heat.§ Here, perhaps, we are to reconcile things by recollecting that, chemically speaking, diffusion and mixture have an entirely different meaning from solution; and by understanding, that

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* The globules in pus were first noticed by Senac, in his Traité de la Structure du Coeur, 1749; and afterwards by Morgan, Hewson, Hunter, and Sir E. Home, in their respective writings.

† Hunter on the Blood. Inflammation, p. 429.

‡ Dr. T. Young, in an Introduction to Medical Literature, p. 548. 8vo. Lond. 1813; and in a Practical and Hist. Treatise on Consumptive Diseases, deduced from original obs. and collected from authors of all ages, p. 26. 8vo. Lond. 1815.

§ Dr. G. Pearson, Phil. Trans. 1810, p. 294.

pus will mix with water, but cannot be dissolved in it. Pus is rendered thick and ropy by alcohol; but is not dissolved by it. When pus is triturated with concentrated sulphuric acid, it is dissolved; and, on the addition of water, it separates in a somewhat altered state. It is likewise soluble in nitric acid; and, when water is added, it separates, provided the solution be recent; but, if the solution has been made some hours, water no longer occasions any change. Pus is soluble in hot muriatic acid, and precipitated by the addition of water. The caustic fixed alkalies, triturated with pus, combine with it into a soapy fluid: with ammonia, it forms a gelatinous compound. Nitrate of silver, and nitrate and oxymuriate of mercury afford abundant precipitates in the mixture of pus and water. Pus is rapidly coagulated in the voltaic circuit, and yields a substance very analogous to albumen.*

DIFFERENCES BETWEEN PUS AND MUCUS.

It has been an object with pathologists to have some certain method of discriminating pus from mucus, two secretions, which in their external appearance greatly resemble each other. A criterion has been particularly wished for in examples of copious expectorations from the lungs in phthisis, as well as for the purpose of deciding positively, whether, in gonorrhea, diseases of the lachrymal sac, purulent ophthalmy, and other affections of mucous membranes, the matter discharged be really and unequivocally pus, or only mucus in a somewhat altered state. Amongst other experimentalists, Dr. C. Darwin, junior, has attempted to find out the means of distinction, and, according to his investigations, the three following characters of pus hold good: 1. Sulphuric acid dissolves it, and the solution is decomposed by water, which *precipitates* the pus. Sulphuric acid also dissolves mucus; but the addition of water separates it in flakes, which *float upon the surface.* 2. Pus is diffusible through dilute sulphuric acid, and through water and brine; but mucus is not. 3. Caustic alkalies dissolve both pus and mucus; but, when water is added, a difference is exhibited, the pus becoming separated, but not the mucus. Professor Brande states, however, that he has not found the last of these alleged criteria accurate; and, (says he,) even supposing all these statements correct, they are of no practical utility; because where pus is mixed with mucus in various proportions, the tests are not sufficiently delicate to distinguish it.

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* Professor Brande, in Lecture on Animal Substances. Vid. Lond. Med. Repository, vol. iv. p. 75.

Another test of pus has been recommended by Grasmeyer. It is as follows: triturate the substance to be examined with an equal quantity of warm water, then add to it an equal quantity of a concentrated solution of subcarbonate of potass. If pus be present, a transparent jelly subsides in a few hours, which is not the case where only mucus is present. Professor Brande says he has repeated these experiments, but that the results were by no means satisfactory.* Besides, these chemical tests, and the general distinction of pus sinking in water, while mucus floats, an optical criterion has been proposed by Dr. T. Young, as a very simple and certain means of ascertaining the nature of matter expectorated from the lungs. He very justly regards the globules as the essential characteristic of pus, and it is from their presence, that the test about to be described is derived, while the colour indicates, that there is no mixture of blood. If we put a small quantity of the substance to be examined between two pieces of plate-glass, and holding it near the eye, look through it at a distant candle, we shall observe the appearance even in the day-time, of a bright circular corona of colours, of which the candle is the centre; a red area, surrounded by a circle of green, and this again by another of red; the colours being so much the brighter, as the globules are more numerous, and more equable. If the substance be simply mucus, there will be no rings of colours, although sometimes there is a sufficient mixture of heterogeneous particles even in mucus, to cause the appearance of a reddish area only about the candle.†

When pus is pure, it does not readily putrefy, but when it contains extraneous additions, this quality is lost. In specific diseases, cases of necrosis, &c., the matter is often mixed with blood, or coagulating lymph, in which circumstance it has more tendency to putrefy, and become offensive. It always partakes of the nature of the sore which produces it. To the surface secreting it, pus is quite unirritating, though sometimes its qualities are such, that they will greatly irritate any other parts with which it happens to come into contact. Hence, the inutility of wiping the matter so completely off the surface of granulations, as some are wont to do, though it is always highly proper to keep the surrounding skin free from it.

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* See Lond. Med. Repository, p. 76.

† Op. cit.

When any disease attacks a suppurating surface, or the constitution, the pus becomes thinner, more transparent, and more disposed to putrefy and grow offensive. *Sanies* is the term frequently given to pus in this degenerated state. Sanies may be very irritating to parts, so as to cause their absorption, but it never has the power of corroding them.

The changes in the appearance of pus arise more from the indolence and irritability of the parts producing the matter, than from disease. Many specific diseases, in healthy constitutions, produce no alteration in the appearance of the matter. Thus, the matter of gonorrhœa, of the small-pox pustule, and of chicken-pock, seems in each case to be made up of similar parts, consisting of globules floating in a transparent fluid, like the pus of a common sore, the specific properties of these diseases being superadded. [*]

With the pus, which is formed upon indolent ulcers, and in scrofulous abscesses, flakes of opaque coagulating lymph are frequently observed.

The discharge from irritable ulcers is often thin, being chiefly composed of an irritating aqueous fluid, mixed with blood. Good pus is most readily produced in situations, near the source of the circulation. [†]

CYSTS OF ABSCESSES, AND TENDENCY OF PUS TO THE SURFACE OF THE BODY.

If there were not some boundary to an abscess, some partition between the pus and the cavities of the cellular substance, the matter would diffuse itself extensively on all sides, like the air in emphysema, or the water in œdema. To prevent this circumstance, we find, that coagulating lymph is deposited immediately around the collection of matter; and, becoming organized, assumes the appearance of a membranous cyst. In abscesses of long standing, the cysts are often of very considerable thickness, while in other collections of matter, that have been sudden in their formation, and have not existed long, the surrounding lymph has scarcely had time to be converted into a vascular membranous cyst. The cysts of all abscesses are both secreting and absorbing surfaces. When the pus has been completely discharged by a puncture, the cavity soon becomes filled again with the same kind of fluid. Very large and palpable collections of matter are often observed to disappear entirely, and in a manner only to be explained by the action of the absorbents.

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[*] Sir E. Home on the Properties of Pus, 8vo. Lond. 1789.

[†] The following works, relative to the nature of pus and suppuration, deserve particular notice: C. Darwin, Experiments establishing a Criterion between Mucaginous and Purulent Matter; Litchfield, 1780. Brugmans, De Puogenia, sive mediis, quibus natura utitur in creando pure; Groningæ, 1785. John Hunter's Treatise on the Blood, Inflammation, &c. 4to. 1795. Sir E. Home, on the Properties of Pus, 1789. Grasmeyer, Abh. von dem Eiter u. s. w. Götting. 1790. G. Pearson, on Expectorated Matter; Phil. Trans. 1809, Part 2. Also Obs. and Experiments on Pus, op. cit. 1810. Part 2. Daraus, in Meckel's Archiv. für diè Physiologie, B. 2. H. 3. Rizzetti de Phthisi Pulm. Spec. Chem. Med. in Mém. de Turin, t. 2. & 3. p. 53—109. Rossi and Michelotti, Analyse Première du Pus; op. cit. t. 3. p. 109—127. Gruithuisen, Naturhist Untersuchungen über den Unterschied Zwischen Eiter und Schleim; München, 1809. Dr. T. Young in Pract. and Hist. Treatise on Consumptive Diseases, p. 26. 8vo. Lond. 1815. Brande in Lond. Med. Repository, vol. iv. 8vo. 1815

Matter always tends to the surface of the body, making its way through a considerable thickness of parts, in order to arrive there. Even when there is but a delicate membrane between the matter and some internal cavity of the body, the abscess generally bursts externally, though it may have to make its way through a remarkable thickness of substance. Its progress is always aided by the relaxation of the skin situated immediately over the abscess. The skin, in this situation, is invariably looser, than when it yields to mere mechanical distention, unless the increase of the abscess be very rapid; and as the matter advances towards the surface, the intervening solid parts are absorbed.

TREATMENT OF PHLEGMONOUS ABSCESSES, AND THE QUESTION, WHEN OUGHT THEY TO BE OPENED EARLY?

The generality of phlegmonous abscesses soon burst of themselves, and need not be opened. When punctured unnecessarily or prematurely, they never heal so favourably as when left to themselves. * The majority of abscesses which are superficial, or at a distance from parts of importance, may be left to burst of themselves. We may also defer opening such abscesses as are slow in their formation, and surrounded by a good deal of hardness of the contiguous parts. †

Particular cases, however, should be opened as soon as the existence of matter is ascertained. When suppuration takes

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* Etenim ab incisione præmaturâ nova inducitur inflammatio, dolores augentur, puris sedes difficilius attingitur, curatioque retardatur. Callisen, Syst. Chir. Hodiernæ, Pars 1. p. 319.

† Thomson's Lectures, p. 336. Callisen, t. i. p. 318.

place in the sheaths of tendons, or beneath fasciæ, which invariably retard the progress of matter to the surface of the body, an early opening ought to be made. When this is not done, the matter spreads to a great extent, separating such ligamentous expansions from the muscles, and the muscles from each other. The necessity of this practice is often demonstrated in whitlows, abscesses under the palmar fasciæ, or the fasciæ of the thigh and fore-arm. Phlegmonous abscesses should not be left to break of themselves, when situated in extremely sensible parts, the distention of which would create intolerable pain. * Suppuration in the eyeball is an example of this kind. An opening is likewise necessary, when the collection of matter lies in a mass of adipose substance, and only presents itself externally, at a very limited point. † Of this nature are abscesses about the anus. Whenever the matter produces evils, resulting from its pressure upon particular organs, its discharge is urgently indicated; as in abscesses near the urethra and neck of the bladder; near the trachea; very close to a bone, or in contact with it, under the periosteum. ‡ The best surgeons, however, do not exactly agree, whether the vicinity of an abscess to certain parts is a proper reason for opening the collection of matter early. Thus, Professor Thomson, and many others conceive, that the situation of an abscess near a bone, or a large artery, renders an early opening necessary, because it is feared, that, in the first instance, the matter will cause disease of the bone; in the second, weakness of the parietes of the vessel, and hemorrhage, or aneurism. But, says another eminent author, when suppuration happens near a bone, the periosteum becomes thickened, as it were for the protection of the part. Besides, pus is neither of a corroding nor irritating nature. When in opening an abscess, which lies near a bone, this part is found affected with caries, or necrosis, it is because it has been originally affected; and, in this case, the abscess is the effect, and not the cause of the altered state of the bone. § And, with regard to the vicinity of a considerable artery to the abscess, it always happens that, when in cases of suppuration, the cellular sub-

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* Delpech, Précis des Maladies reputées Chirurgicales, t. i. p. 29. 8vo. Paris, 1816.

† Delpech, op. et loco cit., Boyer, Traité des Maladies Chir. t. i. p. 60.

‡ Callisen, t. i. p. 319. Thomson's Lectures, p. 337.

§ Boyer, Traité des Mal. Chir. t. i. p. 61, 62., and Wiedmann de Necrosi Ossium.

stance around the vessel is destroyed, the arterial coats are rather thickened than rendered thinner, and they are afterwards covered with granulations, and blended with the surrounding parts.* The truth is, I believe, that, although in open phagedenic ulcerations, arteries sometimes give way, such an event is never caused by the vicinity of a simple abscess. When matter is so situated as to be liable to insinuate itself into the chest, or abdomen, or into the capsular ligaments of joints, it is highly proper to prevent such an extension of mischief, by making a timely opening into the abscess. As a modern author* observes, however, the apprehension of such an evil has been unduly magnified; for, besides the general security arising from that law, by which the matter tends towards the surface of the body, there is a further protection, derived from the thickening of the adjacent portion of the serous membrane, investing the above-mentioned cavities. But, since the records of surgery furnish proofs, that persons have died with matter in their chests, which was derived from without, the same writer admits the prudence of following the customary rule of opening the abscess early.

DIFFERENT METHODS OF OPENING ABSCESSES; AND FIRST OF OPENING THEM WITH A CUTTING INSTRUMENT.

Authors describe three principal ways of opening abscesses; viz. with a lancet; caustic; and a seton. In almost all cases, the lancet is preferable to these other means. It opens the abscess more quickly than caustic, and with less pain; it occasions no loss of substance, consequently, a smaller cicatrix; and, by its employment, the opening may be made in the most advantageous direction, and of the exact size necessary.

The place, where the puncture ought generally to be made, is where the fluctuation is most perceptible; or where the conical eminence, or, as it is termed, the *pointing* appears; for, in this situation, the integuments are thinnest. It is also desirable, (if practicable with due regard to every thing else,) to make the opening in a depending situation, in order to allow the matter to escape as soon as it is formed. Collections of matter, beneath the fasciæ of the fore-arm and thigh, particularly demand attention to this precept, as they commonly point, where those ligamentous bands are naturally thinnest, not where the matter can most readily escape.

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* Boyer, op. et loco cit.

With respect to the size of the opening, the only general direction, which can be given, is to make it large enough to let the matter escape with facility. When the pus is of thick consistence; contains flakes of coagulating lymph; or lies under a tendinous expansion; the opening should be larger, than in ordinary cases.

A grand object in the treatment of most abscesses, after they have burst, or been opened, is to maintain such an opening, as will prevent any future lodgment of a large quantity of pus. When this indication is fulfilled, the cavity of the abscess soon contracts, and becomes filled up with granulations.

When an abscess bursts spontaneously, the opening is not likely to heal, as long as it communicates with a cavity into which pus is secreted; and, consequently, there is no occasion to take any measures to prevent its closing. But, when a collection of matter is deeply situated, and has been opened by an incision, the wound is very likely to close again, especially, if not in a depending situation. In this case, the surgeon must take care to insinuate a piece of lint between the edges of the puncture, and at every visit, introduce a probe through its track.

When a phlegmonous abscess is very extensive, and the skin thin, the opening should be made large, and in a depending situation. But, if the shape and size of the cavity of the abscess should prove impediments to the easy escape of the matter through a single puncture, or incision, one or more additional apertures ought to be practised in such places as seem most advantageous.* When, however, a depending opening can be made, others are scarcely ever requisite.

The formation of, what are termed, *sinuses*, is the constant apprehension of an experienced surgeon in every large acute abscess. When the collection of matter is extensive and deep-seated, or when the opening has not been practised in the most favourable situation for the escape of the pus, the matter burrows passages for itself, which sometimes reach a long way from the original and main cavity of the abscess. These passages, or sinuses, seriously increase the extent of the disorder, and, often having little tendency to heal, before they are laid open, render the treatment more difficult, and the cure more distant. Their direction, extent, and number can only be discovered by the probe, and sometimes not without the utmost difficulty. As they take place from the matter not having a ready outlet, of course, the first indication in the treatment of them is to make such an outlet; and, then, if they will not heal spontaneously, or with the aid of pressure, they must be traced with a probe, and fairly laid open to their very terminations, by means of a curved bistoury.

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* Boyer, t. i. p. 66.

Some abscesses will not heal, though the matter easily finds its way out; and their internal surfaces will not produce granulations, unless a complete exposure of the cavity be made, and fresh inflammation excited. Abscesses about the arms, axillæ, groins, scrotum, and labia pudendi, are often so circumstanced. It is true, however, that many of these cases are hindered from getting well by the cavity of the abscess not having an adequate, or a very direct external communication. Whichever of these explanations be most correct, no sooner is it certain, that a cure cannot be effected by the milder means of a judicious posture, compression, or the use of a stimulating injection, than it becomes the duty of the surgeon either to enlarge the external opening, or lay the cavity completely open to its bottom.

When from any circumstances, which have preceded the formation of an abscess, there is reason for suspecting the complication of a foreign body, the indication, immediately following that of letting out the matter, is to search gently for the extraneous substance, and if loose, to remove it with the least irritation possible.

It was formerly the custom, after puncturing abscesses, to squeeze and press out every drop of matter, which they contained; a practice, attended with a good deal of pain and irritation, and no material advantage. It is therefore not imitated by the best surgeons of the present day, who generally leave the matter to ooze out of itself under the poultice. The old method of stuffing the cavity of the abscess with lint, or charpie, is also condemned, as occasioning needless pain, and opposing the gradual contraction of the hollow, in which the abscess is lodged. *

OF OPENING ABSCESSES WITH CAUSTIC.

When a surgeon prefers opening an abscess with caustic, he generally employs the potassa pura, or this substance mixed with quicklime. The part is first to be covered with a piece of adhesive plaster, which has a portion of it cut out, of the figure and size of the opening intended to be made into the abscess. The usual way of making the eschar is to dip

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* Boyer, Traité des Mal. Chir. t. i. p. 67.

the end of the caustic in water, and rub it on the part, till the skin becomes brown. The active substance is then to be immediately washed off with some wet tow, the plaster is to be removed, and an emollient poultice applied.

This method of opening abscesses is rarely advisable. Indeed, I know of hardly any case in which the practice is decidedly advantageous. It has been fancied, that the method is proper, when the abscess consists of a small collection of matter, which has been long in forming, and is surrounded by a good deal of indolent hardness. The caustic, it is supposed, may then have a desirable effect in destroying some of the induration, and exciting the absorbents to remove the rest. It is believed, that the stimulus of the caustic will kindle a fresh and more lively action in the parts; one, that will be very serviceable in the cure. The most intelligent observers, however, find, that all indurations, arising from acute inflammation, are more likely to be increased, than diminished, by caustic applications; and the plan, therefore, if proper at all, should be chiefly restricted to the preceding imperfect suppurations. It is sometimes adopted in cases of buboes, accompanied with much surrounding induration, partly on the foregoing principles, and partly for the purpose of making a largish, and more permanent opening, than a mere puncture, so as to lessen the chance of the skin healing too fast before the bottom of the cavity is sound, and to remove the hazard of the formation of sinuses. * The method, however, is always painful and severe, and certainly ought not to be indiscriminately, nor frequently practised. It is a great objection to it, that it is impossible to prescribe any precise boundary to the action of the caustic, and that, unless the eschar be made sufficiently deep, the lancet must after all be employed. Caustic also invariably produces an ugly, disagreeable scar; a consideration of material importance in abscesses about the necks and faces of females. Besides all these objections, the eschar is sometimes ten, or twelve tedious days in being detached.

OF OPENING ABSCESSES WITH A SETON.

Professor Thomson, who entertains a just aversion to the method of opening abscesses with a seton, notices the circumstances, in which the plan is ordinarily recommended. First, in large abscesses, where the skin is healthy, and capable of uniting to the opposite side, or bottom, of the abscess.

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* See Pearson's Principles of Surgery, edit. 2. p. 68.

Secondly, in cases where it is wished to draw off the matter of an abscess slowly. And, thirdly, in cases, where it is wished to excite a certain degree of irritation in the cavity of the abscess. The seton has also been supposed to be particularly useful in large deep abscesses, into which we wish to prevent the entrance of air.* Now, as Dr. Thomson has not sufficiently exposed the absurdity of setons, and I conceive that the employment of them in the treatment of abscesses, especially those of the phlegmonous kind, is altogether wrong and pernicious, it behoves me to examine the reasons alleged in support of the practice. With respect to the first instance specified, why are we to use a seton *because the skin is healthy* and *disposed to unite to the subjacent parts?* Is it not as much as to say, a seton, a painful, irritating extraneous substance, a foreign body, must be drawn across an abscess, *because such abscess is already inclined to heal?*

As for the second instance, in which the slow evacuation of the matter is desired, and given as the reason for a seton, such an indication never can occur in acute phlegmonous abscesses, though possibly it may do so in certain large chronic collections, especially *lumbar*, or *psoas* abscesses. After these have been opened, and their contents discharged, a series of alarming febrile symptoms not unfrequently ensue, which have been referred by some to the sudden evacuation of the matter; by some to its absorption; and by others, with more reason, to the inflammation of the extensive cyst of such an abscess, induced by making too free a puncture and leaving it open.† Now, admitting what may be rationally doubted, that suddenly emptying an enormous chronic abscess is worse practice, than a gradual evacution of its contents, cannot the surgeon avoid what is objectionable by making only a small puncture, which is on other accounts judicious, instead of a free incision? A large puncture, besides letting out the matter in the manner apprehended, excites too much irritation, at the same time that it facilitates the entrance of air into the cavity of the abscess, and the consequent putrefaction of whatever matter remains behind. The air, it is true, does not irritate the cyst; but, it promotes such changes in the pus, with which it comes into contact, as render this fluid itself a source of considerable irritation and danger. None of these reflections, however, have any thing to do with acute phlegmonous abscesses, which are of a totally different nature. No dangers arise from their being suddenly emptied, or sufficiently opened, to let the matter freely escape; and, of course, the reasons for applying setons to them entirely fail.

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* See Thomson's Lectures, p. 342.

† See Abernethy's Surgical Works, vol. ii. Obs. on Lumbar Abscesses.

The third reason, above specified, viz. the wish to excite irritation in the cavity of an abscess, would, I am convinced, never be urged by the strongest admirer of setons in cases of acute phlegmonous abscesses, where the wisest, most successful, and scientific practice, as universally acknowledged, consists in the use of soothing applications, and the avoidance of every thing irritating. All further comment on this reason is, therefore, superfluous.

A fourth alleged advantage of the seton is its preventing the entrance of air into the cavity of the abscess. But, how are we to suppose, that it can act in this way, while it allows a thick fluid, like pus, to issue? Besides, is the great and certain irritation, which the seton itself causes, to be rated lower, than that unproved, questionable, ambiguous kind of irritation, formerly imputed to the entrance of air into the cavities of the animal body? This doctrine originated, because irritation was often seen following incisions into such cavities. But, as the air in emphysema causes no irritation, and there is reason to suspect, that the same cavities would inflame, if opened in a vacuum, the opinion seems entitled to little credit. It was a prejudice of this sort, which blinded the eminent Dr. A. Monro* so completely, as to lead him to impute a man's death to the entrance of air into the pericardium, though a hot poker had been thrust into the chest! I can conceive, however, with Mr. Abernethy, that the admission of air into large chronic abscesses may be hurtful by causing putrefaction of the contained matter. I have never known any evils arise from the effects of the air on phlegmonous abscesses.

TOPICAL APPLICATIONS TO PHLEGMONOUS ABSCESSES; DIET; MEDICINES, &C.

The best applications to phlegmonous abscesses are fomentations and poultices. While the skin covering the collection of matter continues entire, they are the best dressings, because they favour the relaxation of the skin, and accelerate the progress of the matter to the surface of the body. When the abscess has been opened, or has spontaneously burst, they are the most proper applications; for they promote the continuance of suppuration, without which, granulations cannot be produced to fill up the cavity. As soon as the cavity is nearly filled up, the more simple and superficial the dressings are, the better.

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* On the Bursæ Mucosæ, p. 41. Also Discourses on the Nature and Cure of Wounds, by John Bell, p. 347. edit. 3.

After inflammation has arrived at a certain pitch, cold applications and continued evaporation from the part affected avail nothing; on the contrary, they seem to augment the pain, and they probably do so by preventing the relaxing process of the skin. All the changes of phlegmonous inflammation are quick; if it is to terminate in resolution, it will generally do so in about a week or ten days: if it continues unabated beyond this period, suppuration may be expected, and perseverance in the use of cold astringent lotions only prolongs the disorder, by retarding what cannot be avoided.

When the abscess has completely formed; when it has been opened, or has burst, so as to emit daily a considerable discharge; and when the violence of the surrounding inflammation is abated: the patient must be allowed a more generous diet. Animal food, wine, and fermented liquors, may now be given with advantage. When the discharge is so copious as to induce debility, attended with loss of appetite, bark is to be administered. Opium may also now be given, either with a view of relieving the aggravated pain that immediately precedes the formation of matter, or of procuring sleep. Attention must of course be paid both to the prevention of costiveness, and of diarrhœa. The favourable progress of all considerable abscesses is very materially influenced by letting the patient have the benefit of a pure salubrious air, and removing him from a close, or crowded apartment.

CHAP. IV.

HECTIC FEVER.

HECTIC FEVER is essentially characterized by a frequent weak pulse, flushings in the face, the hands, or the feet, and profuse night sweets, or diarrhœa. * The irritation of a local injury upon a healthy constitution produces that disordered state of it, termed the *symptomatic*, or *sympathetic inflammatory* fever. This is the *immediate* consequence of local irritation. The system, fatigued and debilitated by the continuance of a disease, which it cannot subdue, at length loses the power of entering into those strong actions, which characterize the preceding description of fever. However, exhausted as it is, it still sympathizes with the local irritation. The exciting cause, as Dr. Young remarks, is almost always some local disease, and generally a great, if not an incurable one; so that this fever seems to be a feeble and hopeless struggle of a constitution about to be overpowered, without any apparent tendency to the removal of the cause.[*] *Hectic* fever is the name, under which this last kind of constitutional disorder is known. Contrasted with the sympathetic inflammatory fever, it is to be regarded as the *remote* consequence of local injury, or disease.[†]

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* See a Practical and Hist. Treatise on Consumptive Diseases by T. Young, M.D. 8vo. 1815, p. 4.

OF THE CONNECTION BETWEEN SUPPURATION AND THE ORIGIN OF THIS FEVER.

The constitutional symptoms, which attend the formation of pus in long-continued, profuse suppurations, or which arise as effects of many obstinate and incurable local diseases, even without any suppuration, are generally comprehended under the name of hectic fever. There are, however, some well informed surgical writers, who still believe, that hectic fever is in every instance connected, if not with the absorption, at least with the formation of pus.[‡] My own observations do not allow me to entertain such an opinion. How commonly do we see patients suffering considerably from hectic symptoms in cases of white swelling, diseased hip-joints, tuberculated lungs, and curvature of the spine, long before any suppuration has taken place? I should say, that the long continued irritation of any severe local disease upon the constitution, whether accompanied with suppuration, or not, generally produces hectic symptoms. Dr. T. Young informs us, that, when he was 15 years of age, he had himself severe hectic, and every other symptom, usually attending the formation of pulmonary tubercles, though these never arrived at the period of suppuration. And, in another place, he correctly remarks: there are cases, in which a particular change in the state of the fluids, secreted by diseased parts, seems to superinduce the hectic symptoms, as when an abscess is opened, and the pus is exposed to the air. But, says he, this state of the fluids is not the only cause of hectic; for, it often occurs, not only without an open abscess, but *without any abscess at all.* And, on the other hand, in cancerous cases, where there is a very unhealthy suppuration, with great pain, there is often no material hectic to the last. * It is true, at the same time, that hectic fever is most commonly preceded by suppuration; but the only reason of this fact probably is, that the greater number of local diseases, which come under the care of the surgeon, are in their advanced stages accompanied with ulceration, or abscesses. We see that certain local diseases, which cannot be called severe, though they secrete for a long time a great deal of purulent matter, do not bring on hectic symptoms. We may keep open an issue for a year, or the urethra may discharge a good deal of pus daily for an immense length of time in tedious cases of gonorrhœa, and yet hectic fever does not arise. Suppuration alone, unless exceedingly profuse, in which circumstance, it must always be the effect of a severe form of local disease, is not to be regarded as the essential cause of hectic.

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[*] Op. cit. p. 10.

[†] The existence of idiopathic hectic is asserted by Galen, Hunter, and Willan; but if such a fever really prevail, its treatment comes within the province of the physician: I exclude it, therefore, from present consideration.

[‡] Thomson's Lectures on Inflammation, p. 326.

Neither does the hypothesis, which ascribes the cause of this fever to the absorption of pus, appear to have a better foundation. The inside of every abscess is both a secreting and absorbing surface, and by the combined action of the arteries and lymphatics, the matter is incessantly undergoing changes. This is a doctrine, which is now professed by every modern pathologist. If then the absorption of pus were a cause of hectic symptoms, they would accompany every abscess, without exception. Yet, experience teaches us, that this is far from being the case; and that pus frequently lies in abscesses for a very long time, without the patient becoming hectic. Nay, we observe, that pus, even of the worst quality, may be absorbed without producing a single hectic symptom; and we daily see the matter of phlegmonous abscesses, scrofulous suppurations, and venereal buboes, manifestly and entirely removed by the absorbents, and yet no hectic symptoms are the consequence.

Hectic fever comes on at very different periods after the commencement of any serious local disease. This is probably owing to peculiarities of constitution; or the particular structure and functions of the part, whose disease operates as a cause. The more delicate and feeble the patient naturally is, and the more severe and incurable the local disease, the sooner do the hectic symptoms generally begin, and the more rapid is their progress.

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* P. 6, 10. and 53.

SYMPTOMS OF HECTIC FEVER.

Sometimes the first accessions of the fever are almost imperceptible; a very slight degree of emaciation; a pulse a little quicker than ordinary, with a trivial increase of heat, particularly after meals, being the only early symptoms.* As the fever becomes more established, the symptoms generally run as follows: a frequent, small pulse, which quickens towards evening, but is always ten or twenty strokes in a minute faster than in health; a moist skin; pale copious urine, with sediment†; a good deal of debility; the tongue seldom so much furred‡ as in most other fevers, its edges being of a bright red colour, and the papillæ swoln and prominent; a florid, circumscribed suffusion of the cheeks; loss of appetite; sometimes an ejection of all food from the stomach; a great readiness to be thrown into sweats; profuse nocturnal perspirations; frequently, a constitutional purging; repeated chills and flushes of heat; derangement of the nervous system; loss of sleep; indigestion; heartburn; flatulence. When, however, the biliary system is undisturbed, the digestive powers are little impaired, and the appetite remains good to the last. In an advanced stage the hair falls off; and the nails become bent.§

Hectic fever is more or less remittent, but never wholly intermittent. It is observed by a late writer, that the frequency of the pulse is generally from 100 to 140 in a minute; seldom falling below 100, even in the time of a remission, and, in some cases, never being under 120; while, in other constitutions, the pulse of health may be so slow that 90 strokes in a minute would be enough to indicate an exacerbation.‖

The principal exacerbations generally occur about five in the afternoon; and, if we are to credit Galen, Vogel, and Wilson, who differ from Cullen on this point, an increase of the febrile symptoms always follows a full meal at any time of the day. The exacerbations, which are mostly preceded by chills, are marked by a sensation of burning heat in the palms of the hands, which become red and mottled, and frequently in the soles of the feet. A circumscribed redness is seen in the cheeks, the colour of which, in persons of a florid and delicate complexion, has also, during the remission, a more abrupt termination than in health. It has not been ascertained by the thermometer whether the temperature of the blood is actually reduced during the chills, which usually precede an exacerbation. Whatever may be the form of the exacerbation in the day time, they are generally succeeded towards the end of the night by copious sweats. When a diarrhœa supervenes in the later stages of the disease, the sweat generally disappears. The reddish sediment of uric acid in the urine is generally observable after the sweats, and absent during the hot fit, when the secretion is usually pale and limpid.*

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* Thomson, op. cit. p. 323.

† According to Dr. T. Young, however, the state of the renal secretion is too various to assist in the distinction of the disease, Op. cit. p. 4.

‡ Where, however, the biliary system is deranged, the tongue is covered with a white coat. (Same author, p. 6.)

§ Dr. T. Young, p. 6. and 9.

‖ Id. p. 4.

Mr. Hunter divides hectic fever into two kinds; viz. one, which arises from the absolute incurability of the local complaint; another, which depends upon a disease that is curable, if the patient's constitution had powers sufficient.†

TREATMENT OF HECTIC FEVER.

The exciting cause of every disease must be removed, ere a perfect cure can be expected. If copious and long-continued suppuration give rise to that affection of the constitution, denominated hectic fever, how can the febrile disturbance cease, while the discharge of matter continues? If the irritation of a scrofulous joint were to excite hectic fever, we should in vain expect to put an end to the constitutional disorder, unless the local cause were first removed. In short, as Dr. T. Young observes, the radical cure of symptomatic hectic fever can only be attempted by remedies calculated to remove the primary disease, on which it is dependent.

When the local complaint, connected with the fever, is totally incurable, the diseased part must, if possible, be removed by a manual operation. But, when the local disease presents the prospect of being cured, provided the state of the constitution were improved, in this case the surgeon is to endeavour to accomplish the latter desirable object. Frequently, however, the nicest judgment and discretion are requisite to determine, how long it is safe to oppose the power of medical surgery to the influence of an obstinate local disease on the consitution; for, although patients, in an abject state of weakness, arising from irremediable local disease, have oftentimes been restored to health by a removal of the morbid part, yet many have been suffered to sink so low, that no future treatment could relieve them. Clemency in the practice of surgery does not consist so much in withholding strong and vigorous measures, as in deciding to practise them the very first moment when they are indicated.

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* Op. cit. p. 7—9.

† Treatise on the Blood, Inflammation, &c. p. 497.

When an incurable disease in an extremity is removed by amputation, the hectic fever immediately begins to abate. "I have known," says John Hunter, "a hectic pulse at 120 sink to 90 in a few hours, upon the removal of the hectic cause; I have known persons sleep soundly the first night, without an opiate, who had not slept tolerably for weeks before; I have known cold sweats stop immediately, as well as those called colliquative; I have known a purging stop immediately upon the removal of the hectic cause, and the urine drop its sediment."

But, though a radical cure of hectic can never be effected unless the primary disease be cured, or removed, the severity of this fever may often be palliated, and its progress retarded, by appropriate remedies. As weakness is one of the strongest features of hectic fever, blood-letting is never admissible; except, perhaps, in a very few examples, where the disorder is attended with unequivocal marks of inflammation in some vital organ. For the same reason, purging, particularly with the neutral salts, must be avoided.

I am afraid no medicine has the direct power of communicating strength to the human constitution; and, it is more than probable, that bark itself only proves serviceable in cases of hectic fever, by its sometimes improving the appetite and tone of the digestive organs. While the patient eats and digests well, I believe it is never of any service.

Bark was a medicine which formerly always filled the old practitioners with a blind sort of confidence in the worst of cases. They saw dreadful forms of disease, accompanied with hectic symptoms, sometimes get well, while their patients were taking bark; but they forgot the vis medicatrix naturæ, whose efficacy often conferred an undeserved reputation on this, as well as many other articles of the materia medica. When first I entered the profession, it was the fashion to prescribe bark to a very great extent. Patients were sometimes literally crammed with it; they were frequently purged, sickened, and weakened by it, instead of being strengthened. Nature, however, occasionally overcame both the disease and the supposed remedy; and the ruling prejudices were confirmed. The best surgeons of the present day use bark much less frequently and copiously than their predecessors. They sometimes give it in hectic fever, with a view of improving the appetite, but never with the supposition that it can directly strengthen the patient in proportion to the quantity taken into the stomach. The infusion, decoction, or extract, is to be preferred to the powder, which has often been known to cause distressing sickness and obstinate diarrhœa. * Dr. Young looks upon steel as the best tonic, when the hectic symptoms have somewhat abated, and general debility has taken place. It may sometimes be joined with myrrh, Peruvian bark, and other bitters. †

The patient is much more likely to be strengthened by nourishing food, easy of digestion, than by bark, and it should be taken frequently, and in small quantities at a time. Residing in a pure, salubrious air, is also a matter of great importance. In these cases, gentle cordials and aromatic draughts, inclusive of a moderate proportion of wine, are sometimes useful, especially in relieving the heartburn, and flatulence, which often prove extremely afflicting.

Here opium is also a valuable medicine, not only procuring sleep, and alleviating pain, but acting, especially when joined with ipecacuanha, as one of the best remedies for checking the diarrhœa frequently present.

Digitalis has been lately praised for its beneficial effects in hectic fever; but Professor Thomson, who has tried this medicine, reports, that he entertains no sanguine expectation of good from it. The frequency of the pulse, says Dr. Young, may indeed often be reduced by digitalis, from 120 to 50 strokes in a minute; but, it is a medicine extremely uncertain in its operation, and frequently violent and unmanageable in its effects. Nor is it either immediately or ultimately beneficial in simple hectic affections. ‡ For checking the nocturnal sweats, no medicine is equal to the sulphuric acid. §

When the local disease is curable, if the constitution could bear it long enough, or the health were improved, medicine may be availing; but the utmost which can be expected from it in all other instances, is a temporary palliation of the symptoms. These, however, will recur, and in the end prove fatal, unless the diseased part, the cause of the febrile disorder, be such as to admit of removal by a surgical operation.

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* Thomson's Lectures on Inflammation, p. 528.

† On Consumptive Diseases, p. 50.

‡ P. 49.

§ ℞ Menthæ Sativæ ℥iss. Conservæ Rosæ ℥ij. Aq. ferventis ℔j. Acidi Sulph. diluti ʒiij. Macera per horam et cola. dosis ℥ij. sextâ quâque horâ.

CHAP. V.

MORTIFICATION.

BY the term, *mortification*, surgeons always mean the death of a part of the body, or the conversion of such part into a dark-coloured, black, fetid, cold, insensible mass, with which the general nervous and vascular systems no longer have any organic connection. In the bones, the process, which corresponds to mortification of the soft parts, receives the name of *necrosis.*

The entire and unalterable cessation of every action and function in the part is absolutely essential in what is understood by mortification; for, sensibility and power of motion may be annihilated, and yet the part affected continue to live, as is daily exemplified in cases of paralysis.[*] Recent observations have proved that the temperature of a palsied limb is diminished[†]; and so probably is the momentum of the circulation in it; still, the fluids pursue their usual course; nutrition and absorption are carried on; and the parts continue to retain, for an indefinite length of time, an inferior degree of vitality.

One of the properties of living matter consists in the power of resisting putrefaction, which the laws of chemical affinity would otherwise produce; but, as soon as a part mortifies, this characteristic property is lost; a spontaneous decomposition begins; different kinds of gas are formed; and the exhalations become fetid and highly offensive.[‡]

Mortification should be carefully distinguished from local asphyxia, or the apparent death of a part, from which case it is essentially different, the latter state not being attended either with a real extinction of life, or an absolute impossibility of recovery. Numerous are the examples upon record, where the heat, sensibility, motion, arterial pulsation, &c. have been abolished in parts for several days, but afterwards gradually returned. This local asphyxia is as different from mortification as suspended animation is from actual death; and the discrimination of it is of the utmost importance, as otherwise there would be a continual risk of amputating limbs, not altogether past recovery. Such mistakes, says Boyer, may be avoided by observing, that where the limb is only apparently lifeless, the cuticle does not separate as in a case of real mortification, nor does the spontaneous decomposition of the part begin, from which the putrid and intolerable smell, peculiar to the latter disorder, is derived. *

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[*] See Boyer's Traité des Maladies Chir. tom. i. p. 105. Paris, 1814.

[†] Earle in Medico-Chir. Trans. vol. vii. p. 173, &c.

[‡] "Cessant inde in parte gangrænosa functiones corpori animato propriæ, et pars emortua generalibus legibus physicis subjicitur." Callisen, Syst. Chir. Hodiernæ, pars 2. p. 375. Hafniæ, 1800.

LOCAL SYMPTOMS OF MORTIFICATION FROM EXTERNAL VIOLENCE, OR EXCESSIVE INFLAMMATION.

The aspect and progress of mortification will be found to vary according to the cause by which it is produced. When it arises from external injury, it is uniformly preceded by inflammatory swelling and erythismus. The injured parts, as M. Larrey † remarks, become tumefied by the vital actions of those textures, which as yet are not totally deprived of life; the epidermis is detached, and forms phlyctænæ; the cutis is softened, and acquires a blackish hue; the cellular substance and other textures are decomposed, so as to occasion not only the emphysema and crepitation, which are very perceptible on touching the parts, but the formation of an abundance of fetid exhalations and moisture. Hence, this species of mortification is often named *humid* gangrene. We find, however, in the midst of this putrefactive mass, especially if the disease be not too rapid, some muscles, arteries, and nerves still in possession of a part of their living powers, and resisting, in a certain degree, the tendency to gangrene. Indeed, it is particularly to the early stage of mortification, while some marks of vitality yet continue, that many authors restrict the term *gangrene*. In it there seems to be a partial, but not a total destruction of the part; the blood still circulates through some of the larger vessels; and the nerves retain a portion of their sensibility. In the language of Galen, gangrene is a mortification, which, strictly speaking, is not actually formed, but forming, being the intermediate stage betwixt the height of inflammation, and the complete death of the part. The latter event receives the technical denomination of *sphacelus*, in which state the parts are generally of a dark brown or black colour, void of all natural heat, circulation, sensibility, &c.; and, in the language of surgery, they are called *sloughs*.

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* See also Richerand's Nosographie Chir. t. i. p. ccxv. edit. 4. Delpech, Précis des Maladies reputées Chirurgicales, t. i. p. 74. Paris, 1816.

† De la Gangrène Traumatique, ou déterminée par une cause vulnérante. See Mémoires de Chirurgie Militaire, tom. iii. p. 145.

Such are the phenomena of that species of mortification which is produced by wounds and other modes of external violence, and which is named by M. Larrey *traumatic*.

It is very different from other forms of the disorder, which are sometimes termed *chronic*, or *idiopathic*, and are occasioned by internal causes, the impression of cold, &c. These last species ordinarily make their appearance on the more remote parts of the body, where the vital powers are weakest, as the feet, hands, nose, and ears. The part affected becomes black; but, instead of being tumefied, as in traumatic gangrene, it rather shrinks, becomes dry, and sometimes hard; on which account, such mortification has acquired also the name of *dry gangrene;* particularly differing from the former in there being no effusion of fluids.

CONSTITUTIONAL SYMPTOMS IN MORTIFICATION.

When any considerable portion of the body mortifies, the whole system generally undergoes a sudden and remarkable depression of all its powers. In such cases, however, as are accompanied with a high degree of inflammation, the disorder is attended in its first stages with inflammatory fever, the strong actions of which usually cease either before or as soon as the parts are in the state of sphacelus. The patient's countenance all at once assumes a wild cadaverous look; he is annoyed with incessant hiccough; the pulse becomes small, rapid, and irregular. The brain, especially in bad examples of traumatic gangrene, is soon affected with coma and delirium; the surface of the body is covered with cold, clammy perspirations; and the patient dies. In other cases, the course of the disease is slower; and the mortification would stop, and life perhaps be saved, if the weakening effects of a diarrhœa could be averted, or the state of the stomach improved.

The hiccough, which I have noticed, is a symptom which deserves particular attention; for, it is an effect which is almost constantly excited on the first occurrence of gangrene and sphacelus. In particular, it is a symptom, of which every man of experience has a well-founded dread in cases of strangulated hernia, where it is nearly a sure indicator of gangrenous mischief within the hernial sac. *

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* See Pott's Chirurgical Works, vol. ii. p. 68. edit. 1808.

Besides the two principal varieties of mortification, which receive the names of *humid* and *dry* from the state and appearance of the sphacelated parts, there is a third species of the disorder, which is peculiar in being of a contagious nature, and, as Delpech * observes, in being followed by a very rapid and singular mode of decomposition in the mortified parts, of which hardly any vestiges appear. No ordinary sloughs are seen; but, in lieu of them, the surface of the diseased part is covered with a whitish, or ash-coloured viscid matter, which exhibits at particular points specks of blood. This case is now well known amongst surgeons by the name of *hospital gangrene.* †

PROGNOSIS IN MORTIFICATION.

The prognosis in cases of mortification differs according to the nature and inveteracy of the causes of the disorder, and the possibility or impossibility of diminishing or removing them. Much also depends upon the strength, constitution, and age of the patient; the greater or less importance of the part affected; the rapid, or slow progress of the disease; and its extent. Great prostration of strength; a low, rapid, faultering pulse; a stomach which can retain neither food nor medicine; and bowels much disordered with diarrhœa; especially when joined with coma and delirium, are symptoms which leave little or no hope of recovery.

As it is impossible to understand the present subject, without taking a separate view of each different species of mortification, I shall next endeavour to fulfil this task with as much brevity as is consistent with truth and perspicuity.

MORTIFICATION FROM VIOLENT AND INTENSE DEGREES OF INFLAMMATION.

1. In the account which has been given of inflammation, mortification was specified as one of its occasional terminations. This unpleasant occurrence is not, however, a very common consequence of phlegmonous, or healthy, inflammation, in a sound constitution; except when the exciting causes

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* Précis des Maladies reputées Chirurgicales, t. i. p. 75.

† In addition to the books enumerated in the Surgical Dictionary, as containing useful information on this interesting disorder, I must not omit to mention Hennen's "Observations on some Important Points in the Practice of Military Surgery," p. 226, &c. 8vo. Edinb. 1818.; and Blackadder's "Observations on Phagedæna Gangrænosa," 8vo. Edinb. 1818.

have been unusually severe, or protracted in their operation. Thus, in cases of burns, gunshot-injuries, contused lacerated wounds, compound fractures, and other effects of great external violence, some of the flesh is frequently destroyed at once, and must be thrown off in the form of a slough; while other parts of it, not actually killed, are yet so injured, that they are seized with a violent degree of inflammation, which quickly ends in sphacelus. In other instances, as I have said, the inflammation ends in mortification, because the exciting cause continues to operate a long time, as we see exemplified in cases of extravasation of urine in the cellular membrane. Here the irritation of the urine immediately gives rise to inflammation; and its lodgment and increase of quantity in the parts are ordinarily followed by dangerous degrees of local mischief, in which urine, purulent matter, and sloughs are blended together.

The symptoms of mortification, as originating from intense inflammation, have been already detailed; and I shall therefore proceed without delay to the consideration of the treatment. In all cases, and in every species of the disorder, there are three very important indications to be fulfilled.

THREE GENERAL INDICATIONS IN THE TREATMENT OF MORTIFICATION.

1st, To stop the progress of the disease.

2dly, To promote the separation of the mortified from the living parts.

3dly, To heal the ulcer resulting from the loss of substance.

1. With respect to the first of these indications, it naturally leads to the important object of ascertaining and removing the original cause of the disorder: I mean that cause which first gave rise to the intense inflammation of the parts, and which perhaps may still continue to operate. This is a common principle, which should be observed here, as well as in all other parts of surgery. Sometimes we have it in our power to remove the exciting cause altogether; as, when we let out, by suitable incisions, extravasated urine, and hinder its further effusion by the judicious employment of the catheter; or when we take away extraneous substances, splinters of broken bone, and remove and diminish irritation in a variety of forms. Frequently also sloughing is produced and kept up by the employment of hurtful remedies, and then the change to a better practice is the same thing as removing the cause of the disease in other instances, and has an equally beneficial effect. In general, however, when gangrene arises

from intense inflammation, the exciting cause is only momentary: it has already ceased; but the injury which the parts have sustained from it is of a more lasting nature, and must be followed by a high degree of inflammation, and sloughing to a greater or lesser extent.

There can be no doubt, that the extent of mortification may be considerably influenced by the mode of treatment adopted during its incipient stage, termed gangrene. When the disorder is the effect of inflammation, we are bound to believe, nay, we see, that the living circumference is inflamed in the highest degree. Reason and observation, therefore, seem both to concur with respect to the general propriety of antiphlogistic measures in this state and species of mortification. The plan, however, is to be pursued with moderation and caution. It may be set down as right, as long as inflammatory fever and acute local inflammation are co-existent with mortification; but, even under these circumstances, evacuations must not be resorted to with the same freedom and frequency, as in examples of inflammation unaccompanied with mortification. In particular, bleeding is to be ventured upon only in young and very robust plethoric subjects. The necessity of this kind of circumspection depends upon the fact, that, whenever a considerable portion of the body mortifies, the constitution immediately feels the shock in every part of it. There is hardly any interval between the genuine inflammatory fever, in which the action of the sanguiferous system seems to proceed even with preternatural force, and another state of the constitution, in which the predominating symptom is prostration of strength. In fact, more or less debility always rapidly supervenes; and if the patient be further lowered by the lancet, purgatives, and too spare a regimen, his condition will be rendered hopeless. When, therefore, the antiphlogistic treatment is recommended, it is not meant, that the patient should be as freely bled and purged, as if his case were one of simple inflammation; but only that the action of the bowels should be gently regulated, internal and external stimulants avoided, and the patient be kept in a quiet, airy, and cool apartment. The lancet in particular must be employed with great circumspection.

OF PERUVIAN BARK, AND OTHER MEDICINES, IN CASES OF MORTIFICATION.

Some years ago, the treatment of gangrene and sphacelus was often conducted upon principles which had little foundation. It was presumed, that the Peruvian bark had a specific virtue in stopping and resisting the progress of the disorder. To this medicine, diluted sulphuric acid, or alum, was added, when a general tendency to putrefaction was suspected in the system; or cordials and aromatics, as wine, brandy, musk, ammonia, confectio aromatica, &c., when there was great prostration of strength; and opium, when severe nervous symptoms, and extreme pain were experienced.

This opinion, respecting the specific power of bark in the stoppage of mortification, is entirely rejected by every modern surgeon of judgment and experience; without denying, however, that it is a medicine, which in particular states and kinds of mortification may be administered with advantage. But, then, the benefit never arises from any specific power, which it was formerly supposed to have, of stopping mortification, but from its being an eligible bitter, by which the tone of the digestive organs may sometimes be improved. It is not long since it was the custom to prescribe it in powder, or substance (as it was termed), and in as large quantities as the patient could be prevailed upon to swallow. But, as soon as it was clearly ascertained, that the utility of bark did not really depend upon its specific virtue in stopping the disorder, the plan of cramming patients with it was universally abandoned; and it is now only administered in such moderate and reasonable doses, as are not likely to disorder the stomach and bowels, and defeat the very purpose for which alone it can ever be truly recommended. It is not, however, in the early stage of mortification, combined with acute inflammation, that bark, prescribed in any way, can be of service. * As Richter remarks, nothing can be more injudicious than the indiscriminate employment of bark in all cases of mortification: in some, it is unnecessary; in some, ineffectual; and, in others, absolutely hurtful. †

When mortification happens from an external local injury in a sound constitution; when it no longer spreads, and the living margin appears red for a small distance from the line of separation, bark is clearly unnecessary.

Mortification, according to its particular nature, causes, and circumstances, may be attended either with sympathetic

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* Mr. Hunter himself must have been prejudiced, when, in speaking of mortification from inflammation, he observes: "Bark is the principal medicine that we can depend upon, as it increases the powers and lessens the degree of action." See Treatise on the Blood, Inflammation, &c. p. 9.

† Anfangsgr. der Wundarzneykunst, b. 1. p. 87.

inflammatory fever; with another fever, which is characterized by extreme debility, and is of a typhoid kind; or with a third species of febrile disorder, which upon the continent is generally called *gastric*, as being principally dependent upon a disordered state of the functions of the chylopoietic viscera in general.

The first fever takes place, when mortification arises from external causes in a healthy constitution. Here bark is usually hurtful. The second fever may undoubtedly often require bark. In the third, however, as the indication is to empty the primæ viæ, it is a medicine which is not likely to prove serviceable.* Indeed, in this last case, it is represented by Callisen as decidedly hurtful, though not given till after evacuations have been procured; and he says, that the patient's preservation will entirely depend upon the judicious exhibition of emetics and opium, and of ipecacuanha joined with carbonate of ammonia.

In condemning the exhibition of bark, however, in these especial examples and states of mortification, I am far from wishing the reader to suppose, that even in the progress of these very identical cases, bark may not sometimes become necessary, although not at all indicated at an earlier period. Every experienced surgeon knows, that the natural change of circumstances in the course of numerous diseases renders the exhibition of some medicines absolutely indispensable, which, had they been given at first, would have had the most pernicious effects. When the inflammation surrounding the sphacelus has abated, the patient is low, the appetite bad, and the kind of fever and state of the chylopoietic viscera are not such as to prohibit the exhibition of bark, this medicine should be administered with aromatic confection, wine, fermented liquors, and a light nutritious diet. If delirium should occur, camphor, musk, or valerian ought to be prescribed, and a blister applied to the head. In many of these cases, also, the patients would be carried off by diarrhœa, were not the surgeon particularly attentive to the diet, and prompt in the judicious administration of opium, the mistura cretæ, &c. Indeed, with respect to opium, it is one of the most valuable remedies which we have in the generality of cases of mortification, and it should be employed in every stage and form of the complaint, attended either with severe pain, or spasmodic, or nervous symptoms.

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* The sentiments of Callisen on this subject are so good, that I shall lay them before the reader: "Minime vero cortex Peruvianus in omni gangræna promiscue adhibendus erit; etenim si a sola causa externa, absque humorum vitio obvio, viribus ægroti integris, exortum fuerit malum, parum utilitatis a corticis usu expectandum erit; si vero febris intensa inflammatoria, vel gastrica, vel gravis phlogosis ad margines partis gangrænosæ adsit, nocivus erit hujus remedii usus. Occurrit nobis gravis epidemia febris bilioso-putridæ, in plurimis gangræna alicujus partis terminatæ, in quo corticis usus, expurgatis licet primis viis, semper et certe nocebat, et sola ægrorum salus in emeticis, et opio, ipecacuanha, et sali volatili nupto, hærebat." Syst. Chir. Hodiernæ, t. ii. p. 382.

TOPICAL APPLICATIONS.

With regard to local applications, in cases of mortification, attended with acute inflammation, experience appears to decide in favour of common emollient linseed poultices and fomentations. Mr. Hunter, however, did not think this practice always right, because warm applications seemed to him calculated to promote the increased action of the vessels, supposed to exist in the process of inflammation, and therefore, says he, " such remedies should be well adjusted to the case." On the other hand, he conceived, " that cold, when carried too far, debilitates or lessens power, but first lessens action." He concludes, however, with saying, " that the parts should be kept cool, and that all the applications should be cold." He justly condemns stimulants as improper, where the actions are already too violent; but he had seen benefit arise from opium applied to the part. * In general, however, as I have said, the preference is now given to emollient poultices and fomentations. When the gangrenous part is turned into a darkish, or black, fibrous, insensible mass, it is indeed of little consequence what is applied to it, as the living circumference claims almost exclusive attention. Both during the extension of the disorder, and afterwards, when the sphacelation has stopped, a simple linseed poultice, or one containing a proportion of finely powdered, recently burnt charcoal, is as good an application as can be employed. Some surgeons are partial to fermenting poultices, and with these not much fault can be found; for, though perhaps no particular good can be strictly imputed to their supposed antiseptic quality, the carbonic acid gas produced by them is not stimulating enough, nor sufficiently in contact with the living flesh, to counteract their good effects as emollient applications. † They have always appeared to

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* Treatise on the Blood, &c. p. 9.

† The following is the formula used at St. Bartholomew's Hospital. ℞ Farinæ Tritici, Cerevisiæ Spumæ *Yest* dictæ sing. lbss. Misce et calori modico expone, donec effervescere inceperit.

me better calculated for mortification, unattended with intense inflammation, than for the particular cases which we are here considering. A few additional remarks on the topical treatment of mortified parts will be presently introduced.

2. The second general indication is to promote the separation of the mortified from the living parts.

CHANGES ACCOMPANYING THE DETACHMENT OF SLOUGHS, AND NATURE OF THE PROCESS.

Although a slough may be scratched, or cut, without pain or harm to the patient, it cannot be pulled away immediately after its formation, without pain, hemorrhage, and even a risk of renewing the spreading of mortification. The dead part is yet adherent to the living flesh, and cannot be prudently taken away before the absorbents have removed the particles of matter, which compose the uniting medium. As a late author * remarks, " the separation of dead from living parts is a vital process, not explicable on physical principles, nor by the laws of dead matter." When it is about to take place, a red line, varying in breadth in different cases, and said to be produced by the adhesive inflammation, usually appears on the living surface, contiguous to the dead.. The adhesive inflammation, in fact, seems to be the means which nature employs for stopping the progress of mortification, and preparing the living surface for the separation which is about to be produced. By it, she fills the cavities of the cellular membrane, with coagulating lymph, closes the extremities of the blood-vessels, and establishes the commencement of those operations, by which granulations are to be formed, and the loss of substance repaired. Soon after the formation of the red line of separation, slight solutions of continuity may generally be seen, beginning at various points, and resembling very minute ulcers, which, uniting together, form a hollow line, or chink, which extends all round between the dead and living parts. † This loss of substance, which is at first superficial, generally proceeds more and more deeply, till the separation of the sloughs is entirely effected. In this process, which does not materially differ from that of common ulceration, the absorbent vessels are actively engaged, and it is by them that the particles which form the link between the dead and living flesh are removed.

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* Thomson's Lectures on Inflammation, p. 383. † Op. cit. p. 384.

From the moment that the separation commences, a discharge, at first of a serous, and afterwards of a puriform appearance, begins to take place from the line of detachment, and it becomes more and more abundant, in proportion as the falling off of the slough exposes the subjacent, raw, granulating surface. In young subjects, and in vigorous constitutions, the separation of the sloughs is accomplished with much more celerity than in the old and feeble. The texture and situation of the parts affected, make also a considerable difference in this respect, and, generally speaking, the harder and less vascular they are, and the more remote from the source of the circulation, the longer they are in throwing off their sloughs.

When a part, or limb, is seized with mortification, the blood coagulates in the large vessels, for some distance from the line which bounds the sphacelation. Hence, the separation of the sloughs is not usually attended with hemorrhage, and the security is generally still further increased by the effects of the adhesive inflammation already described.

The cause of the formation of the coagulum in the vessels, as Mr. Hodgson remarks, is by no means evident, although it is probable, that the condition of a mortified vessel may interrupt the passage of the blood through it, and consequently a coagulum is formed, extending to the next important collateral branch. It is also the coagulation of the blood in the arteries, near a sphacelated part, which accounts for there being sometimes no hemorrhage of importance, nor any occasion for ligatures, when amputation is performed a little above the line of separation. *

IN WHAT DEGREE THIS PROCESS CAN BE USEFULLY INTERFERED WITH; — APPLICATIONS, &C.

Excepting in cases where amputation of the limb is urgently indicated, the separation of a slough should generally be left as much as possible to nature. All that the surgeon can usefully do, is to take away every portion of the slough as soon as it is entirely separated from the living flesh. An opposite line of conduct would often excite unnecessary irritation, pain, hemorrhage, and even a renewal of the spreading of the disorder. It is almost inconceivable what little

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* See Petit's Obs. in Mémoires de l'Acad. Royale des Sciences, an. 1732, Thomson's Lectures, p. 552., and Hodgson's Treatise on the Diseases of Arteries and Veins, p. 15. 8vo. Lond. 1815.

violence will sometimes bring on the latter evil, nor can we be surprised at it, when we advert to the deranged state of the whole constitution, always resulting from the effects of an extensive mortification. If it be at all practicable to expedite the process by which a slough is thrown off, the good is to be derived rather from general, than from local treatment. I know of no applications which have any particular virtue of this kind, and the more simple they are the better. In fact, none are better than common linseed poultices, with or without a proportion of powdered charcoal; or, if the surgeon like, he may have recourse to the fermenting cataplasm already specified. Much stress has been absurdly laid upon the topical use of antiseptics and tonics. Of the former, several strong stimulants, like oil of turpentine, camphorated spirit, &c. have been tried; of the latter, bark, in a variety of shapes, has been used for covering the parts affected. As I have repeatedly said, it matters not what is put upon such parts as are actually dead, and, if the surgeon choose, he may lay upon them turpentine, spirituous balsams, camphorated spirit, or any thing else which he may prefer, with a view of checking the fetor and putrefaction of the sloughs. But, it is of high importance, that the living flesh around and underneath a slough, be not injured and irritated by any sort of applications. No one who has sound ideas of the nature of the animal economy, would talk of invigorating the parts with spirits and balsams, in order to avert mortification. Yet, once so prevalent was this doctrine, that it was a frequent practice to cut and scarify the parts for the express purpose of letting such applications have free ingress to the subjacent living flesh.

INCISIONS AND SCARIFICATIONS.

Making incisions and scarifications into gangrenous parts can do no good, if they are merely made into the sloughs; and, if they extend through the dead to the living flesh, they are not only likely to effect no rational purpose, but must be productive of pain, hemorrhage, and frequently of fresh sloughing. When, however, a slough is large, and a part of it loose, the cutting away such portion is commendable on the principle of lessening the fetor. Were also much sanies to lodge under a slough, a careful incision through the dead part might be useful in affording an exit to the matter. But, the proceeding can never be justifiable, when the living parts are to be at all irritated or wounded.

OF AMPUTATION IN CASES OF MORTIFICATION.

I have remarked, that, in general, it is the best practice to leave the separation of a slough as much as possible to nature. This observation, however, does not apply to certain cases, in which the sphacelus affects the whole thickness of a limb; for, here the surgeon is to seize the right opportunity of performing amputation. It is true, that, even in these examples, if the patients lived long enough, nature would also complete the detachment of the dead parts; the soft parts would first separate down to the bone, the bony connection itself would afterwards be destroyed by the slow process of exfoliation, and the ulcer finally heal. * But, in general, the patient would not outlive the effects which these tedious changes would have upon his health; and sometimes the extension of the mortification itself, would carry him off before they had well commenced. In the most favourable cases, also, the sore would not generally heal so as to leave the extremity of the bone well covered with flesh, and with a cicatrix capable of bearing pressure. Therefore, besides the risks and tediousness of such a mode of cure, the production of a sound and serviceable stump, commonly renders the operation indispensable.

The exact time when amputation should be done, is a question of the first-rate practical importance. The rule, generally laid down, is never to perform the operation before the mortification has stopped, and a line of separation appears between the dead and living parts. This maxim, when followed, in regard to mortification proceeding from internal or constitutional causes, is entitled to every degree of respect, and, were it neglected, the stump would often become gangrenous, and the patient's death only be accelerated.

In a few instances, amputation may even be deferred beyond the period when the sphacelation of the limb has ceased to spread, and the red line on the living edge denotes the commencement of the separation. Such is the case, when the patient is so reduced at this critical moment, that he would be likely to die under the operation. Here, a little delay may sometimes be allowed with advantage; the dead parts will separate from the living, down to the bone, and, if the discharge be moderate, the constitution, with the aid of suit-

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* See facts on this point in Kirkland's Enquiry into the Present State of Medical Surgery, vol. ii. p. 380.

able diet and medicines, will soon recover sufficiently from its depressed state, to be capable of bearing the operation with a better chance of success.

Baron Larrey, as I have already mentioned, has applied the term *traumatic* to the species of gangrene, which follows wounds and external injuries. In cases of this nature, which expose the life of the patient to danger, he says, " amputation should be performed without awaiting the appearance of the line of separation between the dead and living parts." Here, he observes, " it would be dangerous to defer the operation, because the mortification is readily transmitted from the part primarily affected to the rest of the extremity, and he has seen instances, in which it proved fatal in the short space of six hours." He asserts, that there is no reason to fear the re-appearance of gangrene upon the stump, for, whenever mortification arises from external injury, it can only be propagated by absorption and the continuity of vessels. Therefore, says Larrey, if amputation be performed at a proper place, that is, where the skin preserves its integrity, it will arrest the progress, and prevent the fatal termination of the disease. These observations are accompanied with many interesting cases, which, with others recorded in this country, seem to establish the propriety of the practice beyond dispute. *

When mortification originates from the united effects of external violence, and the injury of the main artery of a limb, we are not to be governed by the old rule of waiting for the line of separation, before resorting to amputation. Thus, as Mr. Guthrie has particularly pointed out, when a gunshot-injury of the femoral artery and vein is followed by gangrene, which begins at the extremity of the limb, the surgeon must not defer the operation till the mortification stops; for, if the wounded vessels be in the middle of the thigh, it will extend to the seat of the injury, and destroy the patient before any line of separation is formed. Here amputation should be done as high up as the wound of the vessels, and early, that is to say, as soon as the nature of the case is certain, and before the sphacelation has extended beyond the foot. †

Analogous to the preceding species of gangrene is that sometimes following the application of a ligature to the main artery of a limb for the cure of aneurism, or the suppression of hemorrhage. Here, the mortification also generally commences at the extremity of the limb. Whatever may have been inculcated, with regard to other instances of gangrene, this is a case in which the early performance of amputation at some distance from the dead part has always been recommended.

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* Larrey's Mémoires de Chirurgie Militaire, t. iii. p. 141. Lawrence in Medico-Chir. Trans. vol. vi. p. 184. A. C. Hutchison's Pract. Obs. in Surgery, p. 73, &c.

† See Guthrie on Gunshot Wounds of the Extremities, p. 59, &c. 8vo. Lond. 1815.

In many accidental injuries, the operation should be performed without any delay, so that mortification may have no time to begin. Numerous gunshot-wounds of the extremities, badly lacerated and contused wounds, and severe compound fractures, will inevitably be followed by gangrene, and the patient's death, if an imprudent attempt be made to save the part. Here amputation should be done immediately after the accident, the wound of the operation being infinitely less hazardous than an extensive and spreading sphacelus.

3. The third general indication in the treatment of mortification is to heal the ulcer, or, in the event of amputation, the wound, resulting from the loss of substance. But, on this topic I need not dwell at present, as the principles on which this indication is to be fulfilled, are explained in the respective chapters on wounds, ulcers, and amputation.

MORTIFICATION FROM INJURY OF LARGE ARTERIES AND NERVES.

The maintenance of the circulation of the blood, and of the nervous energy in parts, is what every body knows is essential to the continuance of their vitality. In the arrangement of the arterial system, nature seems, as if she had foreseen the danger that would arise from an interruption of the supply of blood, and she has therefore so multiplied the reciprocal communications or inosculations, in all the different orders or branches of this system of vessels, that the largest trunks are tied almost daily by the enterprising hand of the modern surgeon, and, yet if there be not other causes concerned, this single one is rarely followed by mortification. She appears, however, not to have extended in an equal degree a similar cautious and provident arrangement to the nerves. The destruction of a principal trunk, in this latter system, is invariably followed by paralysis; and, when this circumstance is coupled with the division or ligature of the principal artery, of the same limb or part to which the branches of that nerve are distributed, the chances of mortification are much increased. There are, however, some facts recorded, which prove, that the communications of some of the smaller nerves are sufficiently direct to qualify them to become, in point of function, substitutes for each other.

I have said, that the division, or ligature, of the main artery of a limb and of the principal nerve, together, may occasion mortification. Cases are related, however, in which the consequences were only a paralysis and wasting of the member. But Delpech, in considering this subject, remarks, that he knows of no instances of this kind, where the lower extremity was the part concerned; and, with respect to the arm, which is not supplied by a single nerve, hardly any sort of accident can injure the whole of the brachial plexus; the median being the nerve, which is commonly wounded, or tied, with the artery. He observes, however, that notwithstanding the advantage of several nerves, it has almost always happened, that when the nerve accompanying the axillary artery has been included in a ligature with it, the limb has mortified.*

It is true, that, in many of these cases, we are also to take into the account the share, which a large, extensive wound of the soft parts, or their contusion, laceration, &c. have in the production of gangrene. We rarely, or never see a case, in which the injury simply consists in the division, or ligature, of the main artery and one of the principal nerves of a limb, unaccompanied either with great additional injury, the irritation of a previous operation, the injection of the cellular membrane with blood, or a diseased state of the member, any of which conditions may be such as to have considerable influence in bringing on gangrene. On the whole, perhaps, we are not yet authorized to infer, that the mere interruption of the circulation through the main artery of a limb, and the simultaneous stoppage of the nervous influence derived from one of the principal nerves of the member, would generally occasion mortification, if there were no other additional violence, nor injury, done to the part. † Whatever may be the result of future experiments upon this point, no doubt, I think, can be entertained of the fact, that when the stoppage of the circulation through the main artery of a limb is conjoined with loss of the nervous influence in the same member, there is always a much greater risk of mortification, than if the case were simply an interruption of the flow of blood through that vessel. Indeed, so great is the success, which now attends operations on aneurism, that I might perhaps assert, with perfect accuracy, that gangrene never arises solely from the ligature of an arterial trunk, unless the patient be of advanced age; the circulation languid from previous debility; many of the collateral branches destroyed, or injured; or some other important cause co-operate in producing the evil.

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* Précis des Maladies reputées Chirurgicales, t. i. p. 98.

† Last year, in company with Mr. George Young, I assisted Mr. Lawrence at an operation, in which he divided by a circular incision, not only the principal arteries and nerves of the finger, but every fibre of the part, with the exception of the tendons and bone. Yet, contrary to all expectation, the blood still gushed profusely from vessels, which could only receive their supply of blood through the medium of such ramifications as passed through the tendons and bone. It was equally curious, that, though the principal arteries and nerves were all fairly divided, and the cut carried entirely round the part, mortification was not the consequence. The operation succeeded in checking the progress of an aneurism by anastomosis, which had increased and become attended with many unpleasant symptoms, notwithstanding the radial and ulnar arteries had both been previously taken up by Mr. Hodgson. Some account of this case is given in Medico-Chir. Trans. vol. ix. part 1. p. 216.

When mortification follows the ligature, or division, of a principal artery and nerve, the part is from the first cold, insensible, heavy, benumbed, and motionless; its natural heat is permanently lost; the pulsation of its arteries cannot be felt; the cuticle separates; the skin becomes brown and shrivelled; and fetid exhalations soon leave no doubt of the nature of the mischief. This species of gangrene is usually very extensive, being a sphacelus affecting the whole of the limb. It is somewhat less dangerous, when it comes on later, and begins at the extremity of the limb, under which circumstances, its progress is ordinarily slower, and its effects sometimes restricted to a partial destruction of the member.

When once this kind of mortification has arisen, every means, which it is in the power of the surgeon to adopt, will be found inefficient in stopping its progress. Hence, in tying the main artery of a limb, too much care cannot be taken to exclude from the ligature the accompanying nerve. We should also avoid every thing, which is likely to obstruct the circulation through the collateral branches and capillary system of vessels. In operations for aneurism, the wound should not be larger, nor deeper, than necessary; all compression should be removed; and the limb kept moderately warm.

Several eminent surgeons have thought, that the best way of preventing this species of mortification, in aneurismal cases, would be to effect a gradual constriction of the artery, so that the flow of blood through it might partly continue, until the circulation was well established in the branches of the vessel. But, as Professor Delpech judiciously remarks, this plan cannot be kept up long enough to be of much service in promoting the circulation, and experience has proved, says he, that it is liable to the very great objection of partially destroying the circumference of the artery, without holding its parietes in contact, and of thus occasioning a dangerous, and even fatal hemorrhage.* Besides, as I have already observed, gangrene rarely, or never comes on simply from the ligature of the trunk of an artery; and under favourable circumstances, the inosculations are always sufficient: other causes must therefore be concerned. The avoidance, or (if possible) the removal of these would be a much more important object in the prevention of gangrene, than the dangerous experiment of a gradual and incomplete compression of the arterial trunk.

When the case is decidedly an extensive sphacelus, I believe the only chance of preservation depends upon the immediate performance of amputation, high up; and, if practicable, above the place, where the artery, or the artery and nerve, have either been divided, or tied. In certain examples, however, in which the first appearance of mortification does not happen, till some days after the injury; when the sloughing occurs at the extremity of the limb; and is slower in its advances; the disorder will sometimes terminate in a partial destruction of the integuments of the hand, or foot, and the limb may be saved. But, here the surgeon must be most vigilant; for, if in his anxiety to avoid operating, he give the disease time to extend up the limb, the patient will certainly lose his life.

MORTIFICATION FROM PRESSURE.

Somewhat related to the kind of mortification, which we have just now described, is that which originates from pressure, whereby the circulation in the smaller vessels, and the nervous influence in the parts, are interrupted. As Delpech observes, however, the great extent of the capillary system, and the prodigious number of its inosculations, make the circulation in it so free, that, it must be a powerful and long-continued pressure to stop this important function. The cause may act either upon a limited point of the external surface of the body, or upon the whole circumference of a limb; and, in both instances, the effect may extend to a greater or lesser †depth. When the constitution is enfeebled, pressure much more readily brings on mortification. Of this, every surgeon of experience must have seen repeated proofs in the mortification, which attacks the integuments covering the sacrum, os ilium, trochanter major, and scapulæ, in patients, who have been long confined in bed by fevers, injuries of the spine, bad fractures, &c. The constant pressure of such parts of the skin, between the bedding and bony prominences, obstructs the circulation through them at a period, when the flow of blood is already languid from general debility. They become soft, lead-coloured, red at the circumference, œdematous, and, at last, black and senseless. * The sloughing commences at the point, where the pressure is greatest, thence spreads more or less widely, and terminates in the formation of a foul, ill-conditioned, gangrenous ulcer. Some cases present themselves, in which the skin is so extensively destroyed, that, upon the separation of the slough, the sacrum and neighbouring bones are denuded, and visible at the bottom of the ulcer, the discharge and irritation from which are terrible. Patients sometimes get over severe fevers, bad fractures, &c. and ultimately fall sacrifices to this secondary disease.

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* Précis des Maladies reputées Chirurgicales, t. i. p. 100.

† Ibid. p. 101.

With respect to the treatment of this particular case, I need not remind the practitioner, that he should always be apprehensive of this species of sloughing in patients, who are weakened by disease and long confinement, and compelled to lie for several weeks and months in bed. He ought, therefore, to prevent the occurrence by now and then shifting the posture of the sick; and, especially, he should not forget to examine from time to time the state of the parts, most subject to attack. On the first appearance of any redness, or discolouration in them, they may be bathed with the liquor plumbi acetatis dilutus, and then covered with a piece of the emplastrum plumbi, or, what is still better, the emplastrum saponis. The posture should at the same time be so altered, that the parts affected may not be lain upon. The judicious arrangement of small pillows, or cushions, under particular points, will often give the surgeon essential assistance in the accomplishment of this highly important indication. When sloughing and ulceration have actually taken place, some surgeons apply lint dipped in camphorated spirit; others carrot, or emollient poultices; others a solution of opium and common pledgets. This indetermination, respecting what is really the best kind of dressing, sufficiently proves to my mind, that not much is to be expected from the virtues of local applications. Improving and strengthening the constitution; changing the patient's posture; and, above all things, the strictest attention to keeping the parts affected clean; and to the avoidance of whatever is irritating to them; are the great leading principles, by which the surgeon should be governed.

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* Richter's Anfangsgr. der Wundarzneykunst, b. i. p. 75.

DANGER OF TIGHT BANDAGES, AND CAUTIONS RESPECTING THEM.

The circular compression of limbs by tourniquets and tight bandages, if continued too long, will induce mortification. The smaller the extent of the compression, the greater is the risk; and bandages, which operate equally upon every part of a limb, though they may be somewhat tenser, can be borne with greater safety than a narrow band, or ligature, which acts only upon a very confined space. Yet, let it not be imagined, that the danger of immoderate, long-continued compression is entirely obviated by equalizing the pressure, and increasing the extent of the compressed surface. There are few surgeons who have not beheld melancholy proofs of the fatal consequences of tight bandages. The greater skill now generally evinced in equalizing the pressure upon the whole limb, we must admit, has much diminished the number of these unfortunate examples; but they do still sometimes happen. A surgeon, therefore, should never forget, that, frequently when he is applying a roller, the nature of the disease or injury will necessarily be followed by a great deal of swelling, and for this due allowance should be made in first putting on the bandage. For the same reason, the part should be from time to time carefully examined, and if found to be too much constricted, it should be instantly liberated. Compression is only safe, while it gives no uneasiness; and, when it appears to produce pain, the suspicions of the practitioner ought to be immediately awakened to its dangers. In the practice of surgery it is sometimes proper to wet bandages with cold water, or particular lotions; but, whenever this is done, the fluid makes the bandage shrink so considerably that if the change be not guarded against, the constriction produced will often bring on a rapid mortification of the limb, and the death of the patient. Let surgeons also continually bear in mind, that tourniquets are only designed as temporary means of suppressing hemorrhage, and that if their application be long continued they will be sure to have the most disastrous consequences. *

The perils of immoderate circular compression of limbs proceed not only from the obstruction which it causes in the circulation both through the arteries and veins, but also from

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* Amongst the thousands of cases recorded in proof of this fact, I shall merely refer to one related by a distinguished modern writer, Flajani, Collezione d'Osservazioni et Riflessioni di Chirurgia, tomo ii. p. 26. Roma, 1800.

the interruption of the nervous influence and action of the absorbents.

With regard to the treatment, the indication in an early stage of the mischief is very simple, viz. to remove the bandage, or tourniquet, and have recourse to fomentations, or applications of a discutient, spirituous quality. On this subject Delpech * offers a curious remark, which, if found to be correct, is important; namely, that in these cases it is dangerous to set the parts suddenly free, and that there will be less chance of mortification if the bandage be *gradually* loosened.

When the disorder has advanced further, and actually amounts to gangrene, the conduct of the surgeon must be regulated by the extent of the mischief. If it be partial, let him, after removing the compression, foment the parts and vigilantly observe the changes which occur; for it is the nature of this species of mortification often to spread with incredible rapidity up to the very trunk, and thus in a few hours destroy every possibility of saving either the patient's limb, or his life. Whenever there is reason to apprehend that the case will be of this serious description, if amputation be delayed, the operation should be adopted as the only possible means of affording the patient any chance of life.

MORTIFICATION FROM DEBILITY, IMPAIRED CONSTITUTION, ADVANCED AGE, AND OSSIFICATION OF ARTERIES.

The next examples of mortification, which I shall notice, are those which probably arise from the combined effects of great general debility, an impaired constitution, advanced age, and, perhaps, an ossification of the arteries. Whether this last occurrence, however, should be received in the list of causes, is not entirely settled. We know that in elderly subjects some of these vessels are commonly found in an ossified state, and yet the parts which they supply with blood appear in general to have no tendency to gangrene. This fact is established by observations daily made in every dissecting room, and it is an undeniable proof that ossification of the arteries cannot alone, and without the concurrence of other causes, produce mortification. As also the species of mortification about to be described, mostly occurs in elderly persons, one must naturally expect to find these vessels sometimes ossified in the limbs affected; which is actually the case. But the coincidence of this state of the vessels with gangrene is far from justifying the conclusion that the disorder arises from it as a cause; since in subjects of the same age the arteries are often found similarly changed, and yet the parts which they supply with blood not at all disposed to gangrene. At the same time I am far from denying that ossification of the arteries may not, when joined with other causes, facilitate the access of this kind of mortification; because one can hardly suppose such an alteration of structure entirely unconnected with some diminution of the momentum of the circulation through the ossified vessels. The case of mortification now engaging our attention, is one which differs, as much as any example which can be pointed out, from that which follows common, or any other species of active inflammation. It is peculiar in being often only preceded by a burning pain in the part, which undergoes no swelling, and is sometimes of a pale-red, or livid colour. It constantly attacks parts at the greatest distance from the source of the circulation, and hence frequently begins in the toes, and sooner or later passes on to the foot and ankle, and sometimes to a part of the leg. In a few instances it makes its appearance with little or no pain; but, in most cases, the patient feels great uneasiness through the whole foot and ankle-joint, particularly in the night, even before these parts shew any mark of distemper, or any thing else than a small discoloured spot on the end of one of the little toes. If the patient has lately cut his nails, or corns, it is frequently, though very unjustly, set to the account of such operation. Each sex is liable to it, though it is far most frequent in men. It is more common among the rich and voluptuous than the labouring poor; and oftener attacks great eaters than free drinkers. It frequently afflicts persons advanced in life; but is not confined to old age. I have not, however, seen it myself in any patient under forty-five. Pott could not discern that it was peculiar to any one kind of constitution; though he thought that it most frequently attacked persons who had suffered flying gouty pains in their feet. This case is further remarkable on account of the inefficacy of bark in its treatment, the free internal exhibition of opium being the grand thing to be depended upon for stopping the extension of the disease. The topical applications should be of an emollient, unirritating kind. *

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* Précis des Maladies reputées Chirurgicales, t. i. p. 102.

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* See Pott's Observations on the Mortification of the Toes and Feet. Chirurgical Works, vol. iii. Also, Quesnai's Traité de la Gangrène, p. 324, &c. Paris, 1749.

CONCLUDING ENUMERATION OF THE DIFFERENT SPECIES OF MORTIFICATION.

As the limits and plan of this book prevent my detailing the particulars of several other species of mortification, I shall conclude with enumerating the ordinary causes by which the differences and peculiarities of the several cases are determined. 1. Inflammation attended with violence. 2. Inflammation attended with weakness, whether from a local cause, as certain modifications of structure, or from constitutional causes. 3. Inflammation of a specific or malignant nature, like particular forms of erysipelas, the carbuncle, boil, small-pox pustule, pestilential bubo, &c. 4. Great impairment of the constitution, whether brought on by previous disease, as in dropsical or scorbutic persons, or by intemperance, or by a gradual decay of the vital powers from old age. 5. Stoppage of the arterial or venous circulation in parts, with or without interruption of the nervous influence in them. 6. Great and severe degrees of mechanical injury from external violence, amounting to, what the French surgeons term, a disorganization of parts. 7. Applications which immediately and chemically destroy the flesh, like high degrees of heat, lightening, and a variety of corroding caustic substances. 8. Sudden exposure to warmth after intense cold. 9. Particular organic diseases of the heart and larger blood-vessels. 10. Certain deleterious kinds of food, such as the ergot or vitiated rye*, or barley mixed with the raphanus.† 11. Specific contagion, as exemplified in hospital-gangrene. A few of these cases will be noticed again in the subsequent chapters.

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* See Dodard's Obs. in Journ. des Savans, 1676; Duhamel in Mém. de l'Acad. des Sciences, an. 1748; Langius, Descriptio Morborum ex Esu Clavorum Secalinorum; Phil. Trans. vol. iv.; Tessier, in Mém. de la Soc. Royale de Médecine, t. i. & ii., &c. &c. The accuracy of the statements concerning the deleterious effects of the ergot has been sometimes doubted; and all the evils which are supposed to arise from it, imputed to poverty and starvation. (See Bateman's Practical Synopsis of Cutaneous Diseases, p. 135. edit. 3.) But the experiments instituted by Tessier incline me to believe with Professor Thomson, of Edinburgh, that the ergot, taken in certain quantities, has really a specific effect in producing mortification. See Lectures on Inflammation, p. 547.

† Linnæus, Amœnit. Acad. vol. v.

CHAP. VI.

ERYSIPELAS.

ERYSIPELAS is that peculiar kind of inflammation, which is characterized by a diffused, bright red, yellowish swelling of the part affected, accompanied with a burning, itching pain, vesications, and with little or no throbbing, generally occurring after an attack of fever, and never producing, what may be called healthy suppuration. * The presence of tumour, together with vesications, distinguishes the disease from *erythema.* † It is more commonly a cutaneous affection, than one of parts more deeply situated; although in some constitutions, every inflammation, wherever it exists, will probably be of this kind. The skin, however, appears most susceptible of it, because it will spread over a prodigious surface of the integuments, without extending, at least in ordinary cases, to much of the subjacent cellular membrane. ‡ It more frequently occurs upon the head, face, and limbs, than other parts of the body. When genuine, it has not the deep red hue of common inflammation, but is of a bright red colour, tinged with yellow, which is very manifest towards the termination of the complaint. The swelling produced is without any remarkable induration, flat, and little elevated. The skin has a shining appearance, and when pressed upon, leaves a white spot, which immediately afterwards turns red again. The pain is of a pungent, itching description. The disorder is remarkable for its tendency to spread with considerable rapidity, so that it is often seen covering a very large portion of the surface of the body. Sometimes it shifts its situation, either by receding and attacking some internal or distant part (*erysipelas metastaticum*), or else by getting gradually well on one side, while it spreads on the other (*erysipelas erraticum, vel ambulans*). When erysipelas runs in this manner along the skin, it has a determined edge, and does not lose itself gradually in the surrounding parts, like common inflammation. The skin itself feels only as if a little thickened, and somewhat less pliable, than natural; and, towards the end of the disorder, the cuticle usually peels off.

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* Callisen, Syst. Chir. Hodiernæ, pars i.

† Bateman, Pract. Synopsis of Cutaneous Diseases, p. 125. edit. 5.

‡ Hunter on the Blood, &c. p. 270.

In erysipelas, there is less extravasation, than in phlegmon and œdema, and little, or no effusion of coagulating lymph in the interstices of the part. Adhesions, therefore, are seldom formed, by which the spreading of the complaint can be checked, or boundaries set to abscesses, when they unfortunately occur. In these cases, indeed, suppuration rarely happens, without being attended with considerable sloughing of the fasciæ, tendons, and cellular substance beneath the skin. The latter part, being highly organized, frequently escapes, even when the sloughing of other less vascular parts is very considerable.

This sort of suppuration and mortification is mostly seen, either in severe cases of *phlegmonous erysipelas*, where the inflammation extends more deeply, than common, so as to affect a great deal of the cellular membrane; or else in those forms of the disease, which are attended with typhoid fever, and have been distinguished by the epithets *gangrenous*, and *malignant*. Whenever erysipelas falls into this unfavourable state, the surgeon finds air, matter, and sloughs, all blended together under the skin, and, on handling the part, a strange feel is communicated, neither like that of fluctuation, nor crepitation. There being no adhesions, the matter spreads into the cavities of the cellular substance, and induces the same kind of suppuration wherever it goes. As mortification always follows these abscesses, putrefaction ensues, and the discharge is rendered highly offensive. *

With respect to violence, erysipelas, when idiopathic, admits of being divided into three degrees. In the first and mildest form, it comes on either preceded by no particular complaints, or merely by a very slight indisposition, languor, restlessness, loss of appetite, &c. These symptoms are of short duration, and abate as soon as the erysipelas appears, which increases for a couple of days, then remains unchanged about a similar space of time, and afterwards turns yellowish, and gradually fades away, the cuticle at the same time peeling off. During the whole course of the disorder, no fever is perceptible, the pulse being sometimes only a little disturbed previously to the appearance of the redness.

In the second and more severe degree of the disorder, the patient experiences, for a couple of days before the erysipelas breaks out, unusual debility, heaviness in the limbs, headach, loss of appetite, nausea, actual vomiting, oppression about the stomach, &c. After two days (generally on the third) the erysipelas appears, attended with a gentle perspiration, and an increase in the secretion of urine, when the fever, and all the other complaints subside. The disease then follows the same course as the first case already described.

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* Hunter on the Blood, &c. p. 272.

In the third and most violent degree of erysipelas, which is oftenest seen attacking the face, the patient is affected with severe fever, headach, lethargic drowsiness, shiverings, vomiting, delirium, &c. These symptoms do not, as in the foregoing examples, subside upon the breaking out of the erysipelas on the third day; but continue with undiminished vehemence, until the local disorder itself goes off, which usually happens about the eleventh day, attended with copious evacuations from the skin and kidnies. *

Erysipelas is divided into several kinds, to which the epithets *genuine*, *phlegmonous*, *œdematous*, &c. are applied. The general classification also of all these cases into such as are *idiopathic*, and others which are *symptomatic*, or the effect of some other injury, or disease, is correct and important.

CAUSES OF ERYSIPELAS.

Erysipelas is suspected to originate frequently from a disordered state of the chylopoietic viscera, and particularly from derangement of the hepatic functions. In the days of antiquity, this sentiment had the sanction of Galen; and, in modern times, it has received that of Desault †, Richter ‡, Lassus §, Richerand ||, &c. This disorder (says Lassus) is often produced by a redundance of bile in the alimentary canal, and an emetic, given at the very beginning of the attack, stops its progress very effectually: hence, we cannot wonder, that the Greek physicians should have deemed the complaint the result of a bilious affection. We know, from experience, that certain substances, taken into the stomach, act upon the skin. The eating of unwashed muscles, either in the raw or cooked state, in summer-time, will occasion nausea, oppression of the stomach, thirst, and a kind of erysipelatous inflammation, which spreads all over the surface of the ¶ body.

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* See Richter's Anfangsgr. der Wundarzneykunst, b. 1. p. 98, 99.

† Œuvres Chir. de Desault par Bichat, t. ii. p. 581.

‡ Op. et loc. cit.

§ Pathologie Chir. t. i. p. 10. 1809.

|| Nosographie Chir. t. i. p. ccii. edit. 4.

¶ Cases of poisoning from the eating of muscles are recorded by Montegre in the Gazette de Santé, Mars 1812. Burrows, in London Medical Repository, vol. iii. p. 445. and several others are referred to by Orfila in his Traité des Poisons, ou Toxicologie Générale, t. ii.

These symptoms are relieved by exhibiting an emetic, and afterwards a vegetable acid, such as lemonade, or diluted vinegar. In some individuals, rice is found to have similar effects. *

Authors dwell very much on the obstruction of perspiration by cold, being a frequent cause of erysipelas; a thing, which they consider proved, by the general utility of sudorifics in the treatment. But this, at most, can only be regarded as an exciting cause, which would not produce erysipelatous inflammation, if it were not for the more important influence of certain states of the constitution. The same may be said of every species of external irritation, usually enumerated amongst the causes of erysipelas. A suspicion has been entertained, that erysipelas is sometimes propagated by contagion †; but, whether the commencement and extension of the disorder amongst patients in certain wards of hospitals, as has been sometimes noticed, might not be better accounted for by the operation of epidemic causes, is a point not altogether decided.

That erysipelas generally depends upon some particular state of the constitution cannot be doubted; and this may account for the greater efficacy of internal remedies, than of topical applications, in the treatment. Persons, who lead intemperate lives, and who, in a state of intoxication, meet with local injuries, often have erysipelatous inflammation; while other subjects, of more regular habits, when they receive similar injuries, experience healthy inflammation. At the same time, it must be acknowledged, that erysipelas sometimes arises in constitutions, with which we can find no manifest fault; and females and children, leading perfectly regular lives, are frequently attacked. Yet, possibly, they may be under the influence of internal causes, whose nature is unknown. The obscurity of this topic has not hitherto been removed by pathologists; and even the doctrine of constitutional causes seems to be shaken by the well-known fact, that, it is the common course of the disease to be actually getting well on one side, as fast as it is spreading on another. Perhaps, here, the only mode of reconciling things is to suppose, that parts, which have been affected, lose for a time their susceptibility of the complaint.

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* Lassus, Pathologie Chir. t. i. p. 10. Amongst the few authors, who question the accuracy of this doctrine, respecting the origin of erysipelas from a bilious cause, Delpech deserves to be mentioned. See his Précis des Mal. Chir. t. i. p. 16.

† Wells, in Trans. of a Society for the Improvement of Med. and Chirurg. Knowledge, vol. ii. art. 17.

DIFFERENCES BETWEEN PHLEGMONOUS AND MALIGNANT ERYSIPELAS; OF THE VESICATIONS; OF SHINGLES; CHRONIC, PERIODICAL, AND ŒDEMATOUS ERYSIPELAS.

Erysipelas may be attended with inflammatory, or typhus fever. In the first case, which, as I have remarked, is named *phlegmonous*, or *acute erysipelas*, the external inflammation is redder, more prominent, and indurated than usual; the pain shooting and throbbing; the pulse full and hard; and the fever ardent. In the second case, which is sometimes called *malignant*, or *gangrenous erysipelas*, the patient is much debilitated, the redness is lead-coloured, dusky, or bluish, and the fever plainly typhoid.

In the definition which I have delivered of erysipelas, I have, on the authority of Dr. Bateman, included vesications as one of its characters. At the same time, I am aware, that many of the inflammations which surgeons have to deal with, and which are usually regarded as cases of symptomatic erysipelas, being mostly dependent upon local irritation, wounds, &c. are not attended with these vesications. In the acute erysipelas, there are sometimes no vesications.*

The generality of surgical writers, aware that it is not every erysipelas which is accompanied with vesications, have employed the epithet *vesicular* to denote the particular examples in which such appearances arise. The vesications generally form on the inflamed part, about the third, fourth, or fifth day, and contain a thin, irritating fluid. They gradually burst, when scabs are produced, under which the skin generally heals, but sometimes ulcerates.

To this description of erysipelas, many surgical writers have erroneously referred the *zona*, or *shingles*, which is a variety of herpes (herpes zoster) essentially different from erysipelas in many respects, but, particularly, in its vesicles being small, regular, clustered, and not of large size, and irregularly circumscribed, like the bullæ of erysipelatous inflammation.†

What is denominated the *habitual* or *chronic* erysipelas, often arises as an idiopathic disease, and always in the same place. It is very tedious; but is not generally attended with much fever, nor other serious symptoms. Sometimes, the disorder is *periodical*, recurring in the same person regularly at certain seasons of the year, especially in the spring and autumn. It principally affects persons of advanced age, or women about the period of life when the menses cease.*

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* Pearson's Principles of Surgery, p. 198. edit. 2.

† See the writings of Drs. Willan and Bateman.

The *œdematous erysipelas* is another variety which must not be forgotten. Its attack is not so sudden as that of the phlegmonous and bilious erysipelas; nor is the disease at first so severe. It increases gradually, and is attended with a greater degree of swelling, which is more diffused. The pain is less severe. The fever is accompanied with prostration of strength, and a soft, frequent, and sometimes irregular pulse. The system is not relieved on the appearance of the local affection; on the contrary, the danger increases with the progress of the external disease. The part affected is of a pale red, or yellowish brown colour, and if pressed with the finger, a slight pit remains for a little while. When the face is attacked, it has a bloated appearance; the features can scarcely be discerned; and the eyes are concealed by the swelling of the eyelids. The vesications are smaller and more numerous than in the phlegmonous erysipelas, and, after a few days, change to dark-coloured scabs, much resembling those of the confluent small pox. The disease, when situated about the head, is accompanied with rigors, vomiting, and often with coma and delirium; frequently proving fatal about the seventh day, or a little later.† It never occurs except in bad constitutions, and subjects guilty of excesses in their mode of living.

With regard to the *prognosis*, cases of idiopathic erysipelas, when properly treated, are generally cured about the eleventh day. Considerable danger may arise, however, when external parts of importance are affected; when the disease shifts its situation, and internal organs, such as the brain and lungs, are disordered; or when the case terminates in suppuration and gangrene, either from bad treatment, peculiarity of constitution, or epidemic causes.‡ Erysipelas of the face, cæteris paribus, is more dangerous than in any other external situation.§ The coming on of delirium and coma, subsequently to the eruption, is a threatening circumstance. The *malignant* or *gangrenous erysipelas*, attended with low typhus fever, is always dangerous; and so is the *œdematous erysipelas*, when it occurs as an idiopathic disease, is situated on the head and face *, and accompanied with disturbance of the intellectual faculties.

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* Lassus, Pathologie Chir. t. i. p. 9. Richter, Op. cit. p. 102. Pearson, p. 200. Callisen says: "Habituale erysipelas ex infarctu hepatis ortum ducere solet," t. i. p. 219.

† See Pearson's Principles of Surgery, edit. 2. p. 201, 202.

‡ Callisen, Syst. Chirurgiæ Hodiernæ, t. i. p. 220.

§ Callisen, Op. et loco citato. Richter, Anfangsgr. &c. b. i. p. 105.

CONSTITUTIONAL TREATMENT OF ERYSIPELAS.

Mild cases of genuine erysipelas are in general soon relieved by the exhibition of a few doses of saline, purging, and sudorific medicines. Here, however, only such diaphoretics are allowable as operate without stimulating; and the potassæ nitras, joined with small quantities of antimonial powder, forms as eligible a prescription as can be employed. The patient is to be kept in a warmish, but well-ventilated apartment, and strictly upon the antiphlogistic regimen. Warm, diluent drinks are also commonly recommended, with a view of promoting the operation of the sudorific medicines.

In a more severe form of the complaint, venesection is sometimes useful. When erysipelas is joined with common inflammation, the fever and other symptoms are generally violent, and the signs of bilious disorder but feebly marked. Here, if the complaint should be in the face, bleeding is for the most part absolutely necessary. A copious evacuation of blood, however, is seldom proper, and frequently hurtful. Hence, it is always advisable, even when the symptoms run high, to take away only a moderate quantity of blood at first, and afterwards to repeat the evacuation, should it seem safe and necessary. Although the symptoms may be violent, bleeding never does good, when strong and urgent marks of a disordered state of the chylopoietic organs prevail.

Purgatives are particularly requisite in this more severe case of erysipelas; for, the worse the disease is, the greater is the share which a wrong state of the chylopoietic viscera generally have in the cause of the complaint. Such remedies must be continued as long as the fever is considerable, and the signs of visceral disorder last. Here the same purgatives should be selected as in cases of inflammation in general, viz. potassæ supertartras, sodæ sulphas, manna, &c. with small doses of the pulvis antimonialis.

When the tongue is very foul, with a bitter taste in the mouth, and inclination to sickness; or when the signs of visceral disorder, and the febrile symptoms, yield little, or not at all, to purgatives; and the alvine evacuations have not a very bad smell and appearance; an emetic should be given. Indeed, it is necessary in almost every case of severe erysipelas, and frequently, it must even be repeated. Sometimes, during the use of purgatives, the disorder abates for a little while, and then becomes stationary and tedious: here an emetic generally does immense good. When, notwithstanding the administration of gentle purgatives, the gastric complaints repeatedly return, the diluted sulphuric acid may often be exhibited with decided benefit.[*]

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* See Bateman's Practical Synopsis of Cutaneous Diseases, p. 128. edit. 3. Pearson's Principles of Surgery, p. 202. edit. 2.

In the treatment of erysipelas, from a bilious cause, the celebrated Desault used to administer, in the first instance, a grain of antimonium tartarizatum, dissolved in a liberal quantity of water. The symptoms are said to have frequently subsided immediately after the effect of this medicine, even though a mere increase of perspiration and urine was occasioned by it. When the case proved more obstinate, the emetic beverage was continued, till the febrile disorder and bitterness in the mouth were removed. The cure was then completed, with a dose, or two, of the mildest purgatives. After the first few days, the patient was not restricted to a very low regimen, which was considered by Desault as prejudicial, especially in hospitals.[†]

Bark has been almost as extensively recommended for erysipelas as for mortification. When great weakness prevails, the appetite is bad, and evacuations have been duly practised, it is indeed a medicine which may often be given with advantage. It is also frequently proper, when the disorder, besides being attended with these symptoms, is combined with suppuration, gangrenous mischief, and a profuse discharge. In the *gangrenous erysipelas*, which sometimes afflicts new-born infants, and with which, indeed, they appear to be actually born [‡], bark is said to be an indispensable [§] remedy. Bark, however, is no more a specific for erysipelas in general, than it is for mortification. In the *acute* or *phlegmonous* form of the disorder, both this medicine and opium are now considered quite unnecessary [||]; but in the *erysipelas œdematodes* and *erraticum*, they may be exhibited after the first three or four days, during which evacuations are the chief means of relief. The diet and regimen must conform to the rest of the treatment; being generally at first low and antiphlogistic, and afterwards of a cordial and strengthening kind. When delirium prevails, camphor may be administered, and a blister applied between the shoulders, or rather to the head itself, unless it happen to be the seat of the erysipelas.

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[*] Richter, Anfangsgr. &c. b. i. p. 105, 106.

[†] Œuvres Chir. de Desault, par Bichat, tom. ii. p. 588.

[‡] Sometimes called, therefore, *congenital.*

[§] See Underwood's Treatise on the Diseases of Children, vol. ii. p. 51. edit. 5. Garthshore and Bromfield's Obs. in Med. Communications, vol. ii. Callisen's Systema Chirurgiæ Hodiernæ, vol. i. p. 225.

[||] See Bateman's Practical Synopsis of Cutaneous Diseases, p. 132. edit. 3.

Blisters have, at various periods, been extensively employed in the treatment of erysipelas, and in different manners. They were, however, generally tried in examples where the disorder appeared to have undergone a *metastasis* to internal organs. Here, they were of course laid upon the part originally affected, with a view of bringing back the erysipelas to it. This is a practice which is yet not altogether discontinued, many practitioners having full faith in the principles upon which it is founded. Sometimes, in obstinate cases of erysipelas erraticum, affecting only the surface of the body, blisters were laid upon distant parts, with a view of relieving the disorder in the parts actually suffering. This plan, however, is now less frequently pursued, and we have upon record an instance, in which the blistering of the feet, for the relief of erysipelas in another situation, brought on gangrene of those parts. * The eminent Dupuytren sometimes attacks the erysipelas erraticum with blisters; but in a very different way, for, he lays them directly upon the erysipelatous part, and thus follows up the disorder in every situation to which it may remove. † And Delpech assures us, that in other instances, he has himself frequently seen suppuration, gangrene, &c. prevented by repeatedly blistering the part affected. Nay, Dupuytren sometimes applies the actual cautery to the part, as is alleged, with the greatest benefit.‡

TOPICAL APPLICATIONS IN ERYSIPELAS.

According to some surgeons, external applications frequently do harm, and never are of much service; and every thing wet, whether warm, or cold, emollient, repellent, or astringent, is generally condemned by them.* With respect to the dry, mealy, or earthy powders, which were preferred by Cullen, we have good authority for pronouncing them always useless, and often injurious, since they are apt to form, with the fluid which exudes from the vesications, hard, irritating crusts. Indeed, very disagreeable and dangerous consequences have ensued from their use.† Unctuous substances are universally condemned. Some modern authors ‡ sanction covering the part with little bags, filled with aromatic herbs, to which camphor is added in a more advanced stage of the disorder. Others prefer rubefacients, and mild, warm cataplasms, composed of the powders of aniseed, fennel, camomile-flowers, mixed with oatmeal, or linseed meal, and a strong decoction of poppy-heads. §

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* Alix, Obs. Chir. Fasc. 3.

† See London Medical Repository, vol. vii. p. 248. Richter also recommends similar treatment, and sinapisms to the part originally affected. Anfangsgr. der Wundarz. b. i. p. 109.

‡ Précis des Mal. Chir. t. i. p. 54.

When there are vesications, they should be punctured with a needle, and the fluid absorbed with a fine sponge.‖

When the fever and local redness have mostly or entirely gone, and merely a pale œdematous swelling remains, camphorated or ammoniacal liniments ¶, and the use of a bandage, will remove the remains of the disease; or the part may be covered with a piece of green oil-skin.** On the same authority, we may, when the pain and burning are very violent, lay on the part a piece of flannel, wet with warm milk, or a decoction of elder or camomile-flowers, or poppy-heads; a kind of practice which is also recommended by another eminent writer ††, as the best means of preventing any ill consequences from the acrid discharge of the broken vesications.

Both in the *phlegmonous* and *bilious* erysipelas, arising from internal causes, Desault made use of no topical applications, and left the part affected exposed as much as possible to the air. But, when the erysipelas, whether phlegmonous or bilious, was the consequence of a contusion, wound, or ulcer, he deemed regimen and internal means insufficient, unless assisted by such applications as were best calculated to allay local irritation, and promote suppuration in the sore or wound. With these principles, he employed poultices, the beneficial effects of which are said to have been fully confirmed in his extensive practice. He considered it an essen-

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[*] Richter, op. cit. b. 1. p. 106. Callisen, Systema Chirurgiæ Hod. vol. i. p. 221.

[†] Pearson's Principles of Surgery, p. 218. edit. 2. Callisen, op. et loco cit. Bateman, op. cit. p. 135. Richerand, t. i. p. ccvii. edit. 4.

[‡] Richter, Callisen, &c.

[§] Pearson, p. 219.

[‖] Richter, b. 1. p. 107.

[¶] Pearson, p. 219.

[**] Richter, p. 107.

[††] Dr. Willan.

tial precaution, however, not to let the poultice extend much beyond the contused place, or the margin of the wound, or ulcer; and over the rest of the erysipelatous surface, if he applied any thing, it was the liquor plumbi acetatis dilutus, ʒj to a pint of water. Even refrigerants, such as snow, or ether, may be safely applied to erysipelas arising from external causes.* The observations which I have made in practice, lead me fully to concur with Desault, with respect to the best kind of topical applications in these cases of symptomatic erysipelas.

As for the local treatment of the idiopathic forms of the disorder, I confess, that I entertain no opinion of the real merit either of rubefacients or stimulating poultices; and join Richter, Willan, and Bateman in giving a preference, when the redness and heat are very great, to fomentations and tepid bathing, or else to a lotion consisting of the diluted liquor ammoniæ acetatis. †

In the phlegmonous erysipelas, attended with risk of gangrene, the making of several incisions in the part is said to have averted this unpleasant consequence. ‡ But, when suppuration and gangrene have occurred, the treatment must be regulated by the principles laid down in the foregoing chapters. In particular, early and free incisions are here absolutely necessary, in order to prevent the extension of the mischief under the skin, and to enable the surgeon to draw out the sloughs of tendons, fasciæ, cellular membrane, &c. as soon as they are completely loose. Sometimes, however, the patient has no chance of recovery, except in amputation of the diseased limb.

CHAP. VII.

OF THE FURUNCULUS, OR BOIL.

THE boil is a circumscribed, very prominent, hard, dark-red, painful, inflammatory swelling, which generally suppurates. It is seldom larger than a pigeon's egg, and for the most part single; but sometimes a great number of similar tumors shew themselves at once in different parts of the body, or come out in succession.* This is said to happen more particularly in children, or just after the termination of an acute disease.† Boils are rarely attended with fever, except when they affect very tender parts, or are large and numerous. Under these circumstances, they sometimes cause in children, and even in adults, restlessness, loss of appetite, convulsive motions, &c. In certain instances, as Heister remarks, the whole body is so miserably infested with them, that the patient can hardly tell how to stir himself, or on what part to lie.‡ The particular form of inflammation attending boils, and which Scarpa observes might be called *furuncular*, differs in several respects from common phlegmonous inflammation. The former commences in the skin, extends itself downwards into the subjacent cellular membrane, and produces a more or less extensive destruction of it. Phlegmonous inflammation, on the other hand, originates in the cellular membrane, the vitality of which it does not destroy, and is afterwards propagated externally to the skin. The furuncular inflammation is quickly arrested, and forms a small, circumscribed, hard, and very painful tumor, which, though elevated upon the skin, does not contain extravasated coagulable lymph, but consists entirely of mortified or disorganized cellular membrane; while, on the contrary, phlegmonous inflammation is disposed to spread far through the cellular membrane, into the cells of which a considerable quantity of coagulable lymph is incessantly poured, occasioning the tumefaction. In consequence of the furunculus being completely filled with mortified or disorganized cellular membrane, suppuration in it is very imperfect, and never takes place in the centre of the tumor, but at its circumference, where it is in contact with the sound parts; while, in phlegmon, a true and complete suppuration is formed precisely in the centre of the inflamed part, which, after the discharge of the matter, spontaneously recovers its natural state and functions. In the second stage of the furunculus, the skin, which covers it, ulcerates and bursts at one or more points, and discharges a very small quantity of serous fluid; and the portion of mortified cellular membrane, which composes the body and base of the tumor, then comes away in the form of an extraneous substance, and the cavity which remains, closes and heals in a short time.*

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* Richerand, Nosogr. Chir. t. i. p. ccvii. edit. 4.

† Practical Synopsis of Cutaneous Diseases, p. 154. edit. 5.

‡ A. C. Hutchison in Medico-Chir. Trans. vol. v. p. 278, &c.

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* Lassus, Pathologie Chir. t. i. p. 16.

† Pearson's Principles of Surgery, p. 72. edit. 2.

‡ General System of Surgery, p. 213. edit. 6.

According to other writers, however, a boil is bounded on every side by a kind of gangrenous cyst, and hence, a resemblance has been fancied to exist, between the disease and an inflamed encysted tumor.† But, if Scarpa's observations be correct, the old term of the *nucleus* of the boil is preferable to that of cyst, proposed by Richter. Between boils and carbuncles, a good deal of analogy exists, particularly in regard to the character of the local inflammation; but the former are, on several accounts, trivial complaints in comparison with the latter, as will be hereafter explained.

CAUSES OF BOILS AND PROGNOSIS.

Boils appear mostly to arise from a particular state of the constitution, and to depend upon internal causes. Hence, the complaint is found to be most frequent in the spring-months, and in children, and young persons, of full plethoric habits. It is also noticed to happen very often in that state of the system, which immediately follows the recovery from certain febrile diseases, the measles, small-pox, &c. The common circumstance of many boils being formed either simultaneously, or in succession, in the same patient, is another fact, tending to prove the agency of internal causes, of which, if there were yet any doubt, it would be dispelled by the consideration, that, in some instances, evident marks of constitutional indisposition, for two or three days, precede any appearance of the local disease. Boils of the latter description were thought by the old surgeons to be critical. The boils, which form in children at the breast, are alleged to proceed very frequently from the bad quality of the milk; and, the instances, in which these small swellings are numerous, and disposed to return, are said often to be caused by a disordered state of the chylopoietic organs.‡ There certainly are many boils, which are very properly termed local, with regard to their effects, and the little disturbance they produce in the general system; but, whether the expression is correct, in relation to causes, seems questionable. I know nothing of the accuracy of the common notion, that a boil commences in one of the small glands of the skin.§ Boils, which form singly, in parts abounding in cellular substance, and in constitutions not very much impaired, have no ill consequences, excepting the pain, which they produce. But, when many of them occur, after other dangerous illnesses, or in old subjects, or in very bad constitutions, with considerable fever, they are of a more serious nature, and demand internal as well as external remedies. Some of the worst boils are said to be such as are situated near the eyeball, the joints, the anus, and in the perinæum. *

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* Scarpa on the Principal Diseases of the Eyes, p. 58. transl. by Briggs, edit. 2.

† Richter's Anfangsgr. der Wundarzn. b. 1. p. 132.

‡ Idem, op. cit. b. 1. p. 136.

§ Richter, Callisen, &c.

TREATMENT OF BOILS.

As every attempt to resolve swellings of this kind mostly fails, and the longer it is continued, the more protracted the disease is, the best general practice is to promote suppuration. It seems, indeed, to be the nature of a boil not only to suppurate, but to destroy a portion of the cellular membrane; and, in the few rare examples, in which the surgeon, by means of particular applications, succeeds in bringing about resolution, it is very incomplete, the inflammation alone being removed, and an induration left, which produces more or less inconvenience, from time to time inflames again, and is never totally dispersed, until a free suppuration is excited. †

It is advisable, therefore, only in a very few instances to attempt the cure by resolution. When the plan is thought proper, the most likely means of effecting it consist in bleeding, gentle purging, and a low regimen, together with the application of ice ‡; honey acidulated with sulphuric acid §, or strong vinegar, camphorated oil, &c.

In all ordinary cases, emollient poultices are the right applications, to which, if the pain be very severe, some of the extractum conii, hyoscyami, vel opii, may be added. In some excellent works on surgery, we are directed to continue the use of poultices, until the tumor spontaneously bursts. But, as the generality of boils are slow in breaking, and the patient never gets relief, until the matter is discharged, the most judicious practice is to make an early and rather a free opening with a lancet. The contents should then be gently pressed out, and every portion of the gangrenous cellular membrane, or nucleus extracted, if it can be done without

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* Callisen, op. cit. t. i. p. 328.

† Richter's Ansfangsgr. der Wundarzn. b. 1. p. 133. Also Scarpa, op. cit. p. 60.

‡ Scarpa.

§ Heister, Richter, &c.

giving too much pain. Such is the method, which my observations lead me to prefer, notwithstanding the opposite sentiment of an eminent foreign surgeon *, who condemns an incision altogether, as tending to renew irritation, and disturb the process, by which the slough is detached. When boils are left to burst of themselves, the duration of the disease is generally considerably longer, than when they are opened; and chiefly for two reasons; first, as already observed, because the spontaneous aperture is slow in forming; and, secondly, because when formed, it is not large enough for the ready evacuation of the sloughs, and flakes of dead cellular membrane, contained in the swelling. The presence of the mortified cellular membrane is now known to be one of the principal impediments to cicatrization, and the wisest practice must therefore be, to make such an opening, as will facilitate as much as possible the discharge, or removal of that noxious substance. When this has been done, the employment of emollient poultices, and simple dressings, a few days longer, will generally complete the cure. Many surgical writers recommend the application of escharotics, and particularly the pulv. hydrargyri nitrico-oxydi, with a view of promoting the separation of the slough, and dispersing the remaining hardness. This, however, is a painful practice, which is no more necessary here, than it is in other abscesses, the hardness around which always subsides in proportion as the inflammation abates; and, with respect to the portion of gangrenous cellular membrane, it will not in general be considerable, nor its detention in the part long, if the surgeon follow the above rule of making a proper and an early opening. Boils always present a very prominent, conical apex, while their base is comparatively speaking broad. † The knowledge of this fact must at once convince us of the insufficiency of a small aperture, whether formed by art, or nature.

In severe and obstinate cases, internal remedies, adapted to the particular complications of the disease, are not to be omitted, such as bleeding, aperient medicines, emetics, and a proper regimen. Where several boils occur in a patient advanced in years, bark is said to prove useful; and, in children at the breast, the mother, or nurse, should take some purging medicine, and be put on a strict regimen. The infant should also take small doses of antimony with an absor-

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* Delpech, Précis des Maladies reputées Chirurgicales, t. i. p. 57. Paris, 1816.

† See Pearson's Principles of Surgery, p. 70. edit. 2.

bent powder.* If these plans fail, the milk must be changed.† The disposition of the body, favourable to the production of boils may sometimes be removed by the use of bark, sea-bathing, acids, steel-medicines‡, and the drinking of whey and mineral waters.§ The employment of an emetic and mild purgatives is sometimes the best practice, when there are several boils, or a disposition to relapse, under which circumstances the cause of the disease often lies in the state of the chylopoietic viscera.‖ When boils are very large, and attended with excruciating pain, opium should be administered.

Camphorated mercurial ointment, and the emplastrum ammoniaci are good applications for dispersing the induration, which sometimes remains after the abscess is healed.

Authors describe a *chronic boil,* which is two or three weeks before it suppurates. It mostly occurs upon the limbs, and affects persons, who have suffered severely from the use of mercury, or from the measles, lues venerea, scrofula, or the small pox.¶ The only particularity in the treatment is the necessity of quickening suppuration by the use of fomentations, or the frequent and long exposure of the part to the vapour of hot water. The poultices may also be rendered gently stimulating by the addition of a little camphor, or gum ammoniacum.

CHAP. VIII.

OF THE ANTHRAX, OR CARBUNCLE.

A CARBUNCLE is an inflammatory, indurated, distinctly circumscribed, very painful swelling, of a dark-red or dull-brown colour, somewhat resembling a boil, but larger, and, like it, containing a portion of gangrenous cellular membrane. It is certainly more like an aggravated description of boil, than any other tumor with which it can be compared, though it differs not only in being larger, but also in not presenting so conical a protuberance; the chief part of the swelling lying deep, and none of it being much elevated above the level of the skin. While boils seldom exceed a pigeon's egg in size, a carbuncle is sometimes as broad as a common dinner-plate, as I once saw an instance of in a poor woman, who was in 1808 a patient in St. Bartholomew's Hospital. This magnitude, however, is only seen in very severe cases, and the average diameter of the tumor, though greater than that of boils, will admit of no such comparison. Sometimes the superincumbent skin, besides being discoloured in the manner above described, becomes so remarkably hardened and thickened, that it feels like brawn. The disease in fact is always attended with extraordinary pain and induration, and the patient is generally much afflicted with a sensation of burning, and stiffness in the part. The dark-red, or dull-brown colour of the skin is for the most part chiefly seen upon the centre of the swelling, though, in some instances, the pain and discolouration extend far around. As the disease advances, one or more livid or darkish vesicles, filled with an irritating sanies, form upon its surface; a certain mark of the subjacent gangrenous mischief. On the apex of the swelling, a dark livid spot, bounded by an inflammatory circle, next makes its appearance, followed by the formation of one or several small inadequate apertures, through which a yellow, greenish, bloody, highly fetid discharge flows out, while the great mass of matter, and sloughy cellular membrane still remains confined. As in the boil, the greatest degree of sloughing in all carbuncles is at their deepest part, or base, which occupies a much wider space than the more superficial portion of the tumour. In many cases, indeed, the deeply-seated gangrene is extensive, even when the unaltered state of the superincumbent integuments causes little suspicion of the mischief. By slow degrees, all the sloughs composing as it were the nucleus of the carbuncle, are discharged, leaving a deep ulcer, at the bottom of which one may sometimes see the exposed muscles and tendons.

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* Heister, General System of Surgery, p. 214.

† See Callisen's Syst. Chir. Hodiernæ, vol. i. p. 328.

‡ Pearson, p. 76. § Heister. p. 215. ‖ Richter, b. 1. p. 136.

¶ See Munnick's Praxis Chirurgica, cap. iii. p. 19. Pearson, p. 72, &c.

Carbuncles seem mostly to arise from internal causes, being generally preceded, and accompanied with serious constitutional indisposition. Sometimes the concomitant fever is at first of the sympathetic inflammatory kind, sometimes what foreign surgeons denominate *gastric;* but it generally soon changes into a febrile disorder, the leading feature of which is extreme debility. Great prostration of strength, violent headachs, sickness, loathing of food, and a variety of low febrile symptoms, are the common forerunners and companions of the local disorder, and, in bad cases, syncope, extreme anxiety, and restlessness. The anthrax is well known to be among the symptoms of the plague, and, in this country, it is often attended with severe illness, not unlike the worst sort of typhus fever.

The milder forms of anthrax, where the swelling is not very large, nor the general indisposition at all dangerous, sometimes receive the appellation of *simple*, or *benign*. When circumstances are the reverse of this state, and, more especially, when the fever is of bad type, the carbuncle is termed *malignant*, to which the epithet idiopathic [*] is sometimes annexed. In this case, the swelling exhibits a darker colour than in the less severe instances, and the surrounding œdema of the skin is more considerable. The carbuncle of the plague is called *symptomatic*, or *pestilential*. To these varieties we have lastly to add another, which is endemial in some of the southern provinces of France, which does not arise, like all the preceding, from internal causes, but from the application of a specific contagion, resembling, on its first attack, a flea-bite, but afterwards putting on an alarming character, and being well known on the continent under the name of the *malignant pustule*. [†] While the other kinds of carbuncle may present themselves to the number of two, three, or more, in the same patient, the malignant pustule is remarked to be almost invariably single.

In all other cases of carbuncle, some fever or indisposition always precedes the tumor, but, in the malignant pustule, the local disease at first exists by itself, and the low febrile typhoid symptoms follow. As I am not aware that this last formidable sort of swelling has been described in any English system of surgery, perhaps the following brief account of it may be acceptable. On its first appearance, it resembles a flea-bite, causing a painful itching, and changing into a small serous vesicle, which is about as large as a millet seed, and quickly turns livid or brownish. In the substance of the integuments, a circumscribed flat tubercle is next perceived, of the size of a lentil; this becomes gangrenous, and is converted into a hard black slough, which is bounded by a reddish, shining violet vesicular areola. Considerable swelling follows, and the skin has a glossy appearance. If the pustule be on the finger or hand, the swelling reaches high up the arm, even to the arm-pit; and, if the disease be in the neck or face, the tumefaction spreads over the shoulder.

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[*] Capuron, Methodica Chirurgiæ Instituta, p. 56. 8vo. Parisiis, 1818.

[†] See Methode de traiter les Morsures des Animaux Enragés, &c. suivie d'un Précis sur la Pustule Maligne, par MM. Enaux et Chaussier. Dijon, 1785.

The progress is sometimes alarmingly rapid, the pulse is weak and faultering, and the utmost prostration of strength observable; the patient often dying in the course of two or three days, and the body putrefying with extraordinary rapidity.

The malignant anthrax is said to attack all parts of the surface of the body with nearly equal frequency, excepting the palms of the hands, scalp, and soles of the feet. On the contrary, the benign anthrax is most commonly seen on the nape of the neck, the back, the nates, or the extremities. The malignant pustule, which is supposed to originate from the contact of a specific infectious matter, is alleged to attack generally such parts of the body as are habitually naked, like the face, neck, breast, shoulders, hands, arms, &c. The pestilential carbuncle is most prone to occur on very fleshy parts, and is said never to happen in the arm-pits, groins, or other situations naturally covered with hair. *

CAUSES OF CARBUNCLES AND PROGNOSIS.

The benign anthrax may afflict subjects who are apparently of healthy constitutions, as well as the infirm. It seems in general to arise spontaneously from internal, unknown causes; but, sometimes, as the sequela of some other disorder of the system. The causes of the malignant anthrax are also of an internal unknown nature. The disease, however, is said to be generally restricted to certain districts or seasons, and sometimes to be epidemic. Capuron † sets it down as most frequent amongst children; but the subjects in whom I have happened to see it have all been middle-aged, and most of them persons who had freely indulged themselves in all the excesses of the table. The pestilential carbuncle, as its name implies, has for its cause the plague. The malignant pustule, if the accounts of its origin be correct, is a very singular and peculiar disease; for instead of proceeding from internal causes, like all other carbuncles, it is stated to arise from a contagion derived from animals affected with malignant fever, or carbuncular diseases. The infection is represented as being communicated to the human subject by contact, respiration, deglutition, or the bites of insects. Slaughtermen, tanners, fellmongers, tallow-melters, and other workmen whose business it is to clean and comb out wool, are said to be particularly liable to the disease. In confirmation of this

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* Capuron, op. et loco cit.

† Methodica Chir. Instituta, p. 56. 8vo. Parisiis, 1818.

statement we are informed that no washing will disinfect the wool or hides, harbouring the contagion, which will retain its noxious properties for many years. Notwithstanding the multiplicity of authorities in support of this account, some doubts may be rationally entertained respecting its accuracy, when it is remembered that the alleged causes exist in this country, yet we have no disease which exactly corresponds to the malignant pustule. The French writers also specify want, poverty, uncleanliness, marshy situations, and the autumnal season, as predisposing causes. Were all these circumstances, however, of themselves adequate to the production of the disease, we should certainly see it in some parts of this kingdom. There must, therefore, be other things which contribute to its production, and render it endemial in the southern provinces of France.

In all cases of carbuncle, the prognosis depends very much on the size and situation of the swelling; on the number of such tumors; and, above all, on the state of the constitution. If, together with a carbuncle of considerable magnitude, we remark great prostration of strength, syncope, frequent vomiting, delirium, &c. the danger is urgent.

TREATMENT OF CARBUNCLES.

The carbuncles which are seen in this country, chiefly differ from each other in degree, and in being attended either with inflammatory fever, disorder of the stomach, and other digestive organs; or with extreme debility, and typhoid symptoms. When, as sometimes happens, in the beginning of the disease, a good deal of inflammatory fever prevails, moderate venesection, mild saline purges, and the antiphlogistic regimen, are indicated. But, as the change from strength to weakness is often extremely sudden, the lancet should be employed with caution, and few patients will bear the loss of much blood with advantage. Indeed, the antiphlogistic plan can seldom be continued beyond the first two or three days after which tonics generally become necessary.

Where there is reason to suppose the origin of a carbuncle to be connected with disorder of the chylopoietic organs, nothing is more useful, prior to the accession of much debility, than the exhibition of an emetic which is to be followed up by aperient medicines *, such as a few doses of the hydrargyri submurias, or some cooling febrifuge drink, con-

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* See Richter's Ansfangsgr. der Wundarzn. b. 1. p. 138. Lassus, Pathologie Chir. t. i. p. 41.

taining a sufficient quantity of the antimonium tartarizatum to keep the bowels well open. In this case, however, as in all other examples of anthrax, so great is the tendency to sudden prostration of strength, and typhoid symptoms, that a tonic plan must immediately follow the means which have been adopted in the early stage, with a view of improving the state of the chylopoietic viscera. Here bark, camphor, and wine are medicines of the highest value.

As the pain of carbuncles is generally very severe, opium is another remedy which can seldom be dispensed with; and it is frequently a good plan to prescribe it in repeated doses, so as to keep the patient under its influence.

In very bad cases, attended with delirium, the head should be shaved and blistered, and, with the other medicines, a liberal quantity of camphor should be combined.

On the necessity of letting the patient enjoy the benefit of plenty of fresh air, in every instance of a typhoid kind, it is scarcely requisite to insist: it is a measure fully as important as the choice of medicines, and in some respects more so, as without it all the articles of the materia medica will be ineffectual.

The local treatment of carbuncles is more simple than the constitutional, because in every case there are a few leading indications, which ought invariably to be observed.

And, first, the surgeon should be impressed with the inutility of endeavouring to resolve a carbuncle by any cold or astringent applications, a method, which (to say the best of it) is only loss of time. The most judicious practice is always to have recourse at once to emollient poultices and fomentations.

The openings which form in the tumor are sometimes numerous, but so small that the matter and sloughs cannot readily escape. As they are likewise slow in forming, as well as inadequate to give a free outlet to the contents of the tumor, the best practice is to make an early and free incision. The surgeon should then press out as much of the matter and gangrenous cellular membrane as he can, without causing too much pain. An emollient poultice is now to be applied; the rest of the sloughs gradually loosen; the discharge improves in quality; the surrounding induration diminishes; the ulcer becomes cleaner and granulates; and the cavity is at length filled up and healed. In other less fortunate examples, however, the patient's constitution sinks; no healthy changes occur; and death soon follows.

The ancients * made it a rule to apply the actual cautery to

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* A. Corn. Celsus, lib. 5. cap. 28.

carbuncles in general; and this method is still pursued in France. Our brethren abroad adopt the old notion, that the heated iron stops the progress of the gangrene, and produces a salutary irritation, which invigorates the debilitated parts. Several of the modern French surgeons also occasionally employ the strongest caustics, such as the muriate of antimony; sulphuric acid; the muriatic acid, &c. A bit of charpie is dipped in them, and laid upon the centre of the swelling; or a small puncture is first made, and the caustic liquid then introduced with a pointed piece of wood. This is a practice which has long been exploded from English surgery; and though I can conceive that both the cautery and caustics have really acted beneficially, it has not been on the principle of any salutary irritation arising from them, but for the more simple and plain reason of their occasioning a free opening in the skin for the discharge of the matter and sloughs. As, however, the lancet will do this more expeditiously, and perhaps less painfully, I see no necessity either for the actual or potential cautery.

CHAP. IX.

ŒDEMA.

ŒDEMA is a preternatural accumulation of an aqueous fluid in the interstices of the cellular substance of a part. It is the same sort of disease, as anasarca, only less both in degree and extent.

The tumor is uncircumscribed. The skin of the swollen part retains its natural colour: if at all changed it is rather paler. The part has a cold feel, and the pressure of the finger occasions an impression, or *pitting*, which remains some time, and slowly disappears. There is no acute pain; but there is an uneasiness, or sense of weight, and tightness. When the œdematous limb is in a depending posture, the magnitude of the tumor is increased; *et vice versa.*

In a few rare cases, the tumor is quite circumscribed, and of remarkably small extent: Mr. Pott mentions his having seen an affection of this kind, entirely confined to one side of the skin of the scrotum. This is to be wondered at, as the fluid is situated in the common cellular substance.

Sometimes, œdema is conjoined with erysipelatous, or phlegmonous inflammation.

It was probably the latter case which Mr. Hunter called *œdematous inflammation*, and which is attended with an extravasation of water, and the appearance of common inflammation, the skin having a scarlet colour, which, however, is more diffused. The effused fluid being principally serum, the swelling is even more diffused than the inflammation itself. The part affected is very painful; but is not attended with much of the throbbing sensation which accompanies common phlegmonous inflammation. The affection seems only superficial, though it probably extends to some depth. According to Hunter, the difference between this and common inflammation, arises from the principle of inflammation acting upon a dropsical disposition, which is always weak. A stronger constitution would have produced the adhesive stage of inflammation, from the same cause. Œdematous inflammation is more lasting than common inflammation, and seldom suppurates. Should it do so, the cellular substance, in the interstices of parts, is apt to slough, and extensive, uncircumscribed abscesses to occur. *

CAUSES OF ŒDEMA.

Œdema may depend on constitutional or on local debility. Contusions, sprains, the long-continued use of splints, bandages, relaxing poultices, and washes, are often local causes of œdema. A part which has undergone acute inflammation, often remains œdematous for some time afterwards. In all these instances the tone of the vessels being impaired, is the cause of the disease. The complaint is very often owing to some impediment, preventing the return of blood towards the heart. The pressure of the gravid uterus on the iliac veins, often renders the lower extremities œdematous. Aneurisms frequently compress the chief veins of an extremity and bring on this affection. Œdema must in many instances be a mere symptom of other diseases, which operate as a cause. It accompanies ascites, hydrothorax, deeply-seated abscesses, &c. &c.

TREATMENT.

No cure can be expected till the particular cause has been removed. To promote the absorption of the extravasated fluid, however, and to re-establish the original tone of the vessels, are always grand indications.

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* Hunter on the Blood, &c. p. 269.

The limb should be kept in a horizontal position. Frictions made on the part with flannel, fumigated with aromatic vapours; the application of camomile flowers, and preparations containing camphor; and a moderately tight roller; will tend strongly to rouse the absorbents into action.

The operation of these means may be considerably assisted, by giving internally purgatives, diuretics, and emetics.

If the tumor should not soften under this plan, but become so tense as to occasion pain, inflammation, and the danger of gangrene, the fluid may be discharged by means of small punctures. These, however, are not void of danger; for, all wounds in dropsical constitutions, and parts, easily become gangrenous. The punctures, therefore, should be as small as possible.

It is chiefly, however, in cases of anasarca, or those attended with a general dropsy of the whole body, and an extensive extravasation of water in the cellular substance, that scarifications become necessary, and not for the local swelling, implied by the term œdema.

When the œdematous part is inflamed, every thing irritating should be removed. No bandages should now be employed. The limb should be placed in a horizontal position, and covered with the lot. plumbi acet. Cooling purgatives are to be given, and the antiphlogistic regimen observed. Such inflammation is apt to occasion dangerous sloughing.

In cases, unattended with inflammation, electricity may sometimes be tried with advantage.

CHAP. X.

BURNS.

THE injuries inflicted on the human body by the application of fire, or heated substances, are all comprised under the name of burns; with this understanding, however, that when the accident is occasioned by boiling water, or other hot liquids, it is generally called a *scald*. Callisen [*], and others *, consider a burn to be nothing more than inflammation, with its ordinary consequences, brought on by the action of high degrees of heat upon the texture of the body. With this idea, we must associate another, in order to render the definition accurate; viz. that in many severe burns, some of the flesh is destroyed instantaneously by the fire, which actually kills, and even decomposes it, without there being any time or opportunity for previous inflammation.

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[*] Systema Chirurgiæ Hodiernæ, t. i. p. 298.

Burns are mostly divided into four species, or rather degrees. In the first, or mildest, there is but a slight redness of the skin, without any swelling or fever, and only a gentle inflammation is excited, which soon subsides. In the second degree, the redness is attended with swelling, the pain is sharp, and, if the burn be of much extent, and the constitution delicate and irritable, the injury gives rise to more or less symptomatic fever. The inflammation is acute, but it commonly terminates in resolution. In the third degree, vesicles arise either in a sudden or gradual manner, and contain a limpid or yellowish fluid. These indicate that the burnt or scalded surface has suffered more from the application of the heated or ignited substance, than in either of the preceding examples. The symptomatic fever is also more severe, the pain greater, shiverings and convulsions sometimes occur, and, unless the vesications be few and small, suppuration cannot be avoided. In the fourth, more or less of the burnt part is deprived of its vitality, or is so injured by the fire, that, after an attack of violent inflammation, the flesh rapidly mortifies. In large or deep burns, attended with this fourth degree of injury, the constitutional symptoms are usually very severe, the pulse is quick, small, and sometimes irregular, and the disposition to shiverings and convulsions greater than in the foregoing case. It is observed, however, that where the burnt surface is at once destroyed, the case is generally less painful, than other instances in which the degree of injury is somewhat less violent.

Thus, the two slighter kinds of burns generally admit of resolution, the third case is followed by suppuration, and the fourth by mortification. The quantity of injury depends upon the intensity and duration of the heat applied, and upon the extent of surface upon which it has acted. As heated fluids part with their caloric in being diffused, scalds are often attended with various degrees of injury at different points.

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* Methodica Chirurgiæ Instituta, auctore I. Capuron, p. 57. t. i. Parisiis, 1818.

It has been correctly remarked, that every division of burns must be in many respects arbitrary. The phenomena, which occur in the milder species, present themselves also in the more severe; and, we frequently see in one and the same burn, simple inflammation in one place, suppuration in another, and elsewhere, ulceration, gangrene, and mortification. Probably, it is partly from inattention to this circumstance, that so great a diversity of opinion has prevailed, with regard to the best method of treating burns. Nor may it have been duly recollected, that the state of a burn is constantly changing, so that the remedies which are proper in one stage, may become useless and hurtful in another. The peculiarities of constitution also cause striking diversities in the appearances of burns, and in the effects of remedies upon them. Hence, of several burns resembling each other at first, and treated exactly alike, not two will heal precisely in the same manner.*

The danger of burns is proportioned to the extent, as well as the violence of the injury; hence, cases of even the fourth kind, not occupying much space, may be insignificant, while others of the first and second descriptions may be dangerous, and, indeed, actually fatal from their large extent. The danger of scalds is often considerable on account of their size, but burns may be attended with great risk, not merely in consequence of their magnitude, but also by reason of the depth to which the parts are injured or destroyed. The age and constitution of the patient make a good deal of difference in the chance of recovery; burns in delicate unhealthy subjects, and in young children, being more dangerous than in strong, healthy, adult subjects. The situation of the burn is another consideration of importance; for burns about the head, throat, chest, and abdomen, generally have worse consequences than similar injuries of the limbs. Burns of the first and second degrees, unless they occupy a large surface, may be said to be usually free from danger, and by proper treatment, the inflammation may almost always be resolved. In cases of the third degree, suppuration commonly follows, and, if the injury be extensive, there may be a great deal of fever, and considerable danger. Large chronic ulcers are also a frequent consequence. Cases of the fourth degree, cæteris paribus, are the most dangerous of all, and never can be cured without a detachment of the dead parts from the living. Burnt patients may die from the violence of the inflammation, from the size and depth of the injury, and the seeming shock of it upon the whole constitution, from the severity of the symptomatic fever, from convulsions, from the profuseness of the discharge, or from the effects of gangrene. Sometimes extensive burns of the skin appear to bring on a great difficulty of breathing; an effect which has been occasionally thought to depend upon a connexion between the functions of the skin and those of the lungs, as both are continually separating a large quantity of water from the circulation. It is the fact, however, and not the explanation of it, which chiefly merits notice.

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* See Thomson's Lectures on Inflammation, p. 586.

Severe suppurating burns often produce disfiguring, irregular scars, stiffness and contractions of joints, wryness and distortions of parts, irremediable blindness, specks upon the cornea, concretions of the fingers, toes, or eyelids, a closure of the lachrymal passages, or of other ducts and apertures, eversions of the eyelids, and a variety of other deformities and mutilations.

TREATMENT OF BURNS.

With respect to the treatment of burns, perhaps, we shall find in no branch of surgical practice a stronger disposition to prejudice and credulity. A preposterous belief in the possibility of discovering some particular application calculated for every sort of burn, and (what is more wonderful) for every stage and state of it, has not been one of the least absurdities which have disgraced this part of the healing art. Yet, one would suppose, it requires but little intelligence to discern, that as all burns are not alike, no single plan of treatment can be invariably right. Too often the salutary operation of the vis medicatrix naturæ has been mistaken for a sort of proof of the good effects of several inert, or pernicious remedies, and it has not been properly remembered how many burns would get well of themselves; nay, how many do actually undergo a cure, notwithstanding all the difficulties created by bad and unskilful surgery. If, however, a proposition at the beginning of this chapter be correct, viz. that the effects of burns are analogous to those of inflammation in general, inclusive of suppuration and mortification, then the same common principles which guide us in the treatment of inflammation and its consequences, ought undoubtedly to form the rule of our conduct in the treatment of burns. Nor can it be questioned, that these accidents must require as much variety of management, as any other cases, in which are seen exemplified all the different states and stages of inflammation.

ulceration, mortification, &c. It would not be more ridiculous to suppose, that all the numberless varieties of gunshot wounds, should be left to the efficacy of some favourite plaster or ointment, than to fancy, that burns of every degree and condition, should have only one sort of dressing; or, that if a change be made, this is not to be regulated by the state of the injury, but rather by the time or period of it. Thus, if we follow the advice of some writers, we are to dress all burns the first day with a certain application, the second day with another, and other alterations follow every rise of the sun. But this mechanical and unscientific way of legislating in surgery by the clock or sun-dial, is totally inconsistent with every notion which I can form of right practice. It must be wrong, insomuch as the state of burns, at fixed periods after their occurrence, must be infinitely various, not only on account of the different degrees of primary injury, but also because the nature of the patient's constitution, his age, strength, weakness, health, &c. constantly have vast influence over the subsequent appearances of the injured part.

In the treatment of superficial burns and scalds, the indications are to remove the inflammation, and, by this means, prevent the formation of blisters; but, if we fail in this purpose, we must endeavour to hinder the vesications from becoming painful and troublesome ulcers. In a preceding chapter, I have explained the acknowledged efficacy of cold applications in diminishing inflammation, and most of the observations which have been there introduced, might be here repeated. The practice of employing cloths dipt in cold water, or in rose-water, cooled with ice or snow, as dressings for the less severe cases of burns, is as ancient as the time of Rhazes. The plan should be adopted as soon after the accident as possible, it being, as Avicenna has remarked, one of the best ways of preventing the formation of blisters. Another good method, when the situation of the injury will admit of it, is to immerse the scalded or burnt part, in very cold spring or ice water; or else to pour fresh cold water plentifully over the injured surface. Pounded ice *, inclosed in folded linen, or mixed with hog's lard, is another excellent application for scalds and superficial burns, situated on the head, back, and other parts which cannot be conveniently immersed in cold water. It would be endless to enumerate all the different local remedies, which, at least in burns

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* Essay on the Means of lessening the Effects of Fire on the Human Body, by Sir J. Earle.

unattended with any separation of the cuticle, exposure of the cutis, or ulceration, operate chiefly, if not entirely on the principle of reducing the temperature of the part. Suffice it to mention various spirituous lotions; spirit of wine itself, the lotion of the liquor plumbi acetatis; and the dressing so much in vulgar repute, raw potatoes scraped into a soft pulp. All these applications being colder than the burnt surface upon which they are laid, tend directly to lower its temperature, an effect which they must further produce by their continual evaporation. But, in order to derive the utmost benefit from cold applications, they should be frequently renewed, as they soon become of the same temperature as the parts with which they are in contact.

Although it seems to be generally admitted, that no local remedies are better than such as are cold, for the relief of scalds and superficial burns, there is nearly the same unanimity amongst surgical writers respecting the danger of extending this practice indiscriminately to large or severe injuries of this nature, especially when situated upon the trunk. In extensive burns, however superficial they may be, the patient is liable to be affected with cold shiverings, and these shiverings may be greatly aggravated by exposure, and the application of cold.[*] Yet, when I find an author so eminent as Callisen, talking about cold water driving the calorific matter inward, while vinegar and spirituous lotions draw it out[†], I begin to suspect, that all which he has written is not founded upon experience. Also, while we agree with him, that some patients cannot bear cold applications, another of his remarks appears to require further examination, viz. that the sudden cooling of a heated part, like the sudden warming of a part which has been exposed to intense cold, will occasion gangrene.

In speaking of the treatment of inflammation, I had occasion to notice the curious and seemingly inconsistent facts, of that process being sometimes most benefited by cold, and sometimes by warm applications. We find the same thing exemplified in the milder kinds of burns, and even more; for, if we are to credit a long list of writers, including Aristotle himself, as well as several distinguished moderns, holding the burnt part near the fire immediately after the accident, is an effectual plan of rendering the symptoms milder. This method of *burning the burn*, as the phrase runs, is then not merely a vulgar practice, but a plan sanctioned and seriously commented upon by men of the greatest eminence. Thus, Callisen joins many others in asserting, that notwithstanding the increase of pain during the application, it prevents inflammation, and vesications; and that this practice, or the use of hot fomentations, is advisable before much inflammation has supervened. * Yet, as Professor Thomson justly remarks, the plan, notwithstanding so many authorities in its favour, has never come into general use. The inflammation of superficial burns has a natural tendency to resolution, and, as this happens under the influence of both hot and cold applications, one is almost inclined to believe, that nature, in effecting the cure of most cases of superficial burns, needs but little assistance from art; and that, whatever degree of credit practitioners may take to themselves for the spontaneous results, which occur under different modes of treatment, the cure in reality ought to be ascribed to nature. †

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[*] Thomson's Lectures on Inflammation, p. 591.

[†] Syst. Chirurgiæ Hodiernæ, t. i. p.

Perhaps we should view in a similar light certain applications, which are said to do good by keeping the burnt surface from the effects of the external air; as, for instance, olive oil, the linseed oil and lime-water liniment, &c. In those milder burns, where the insensible cuticle is for the most part unbroken, how are we to imagine that the external air could prove so hurtful, even were it possessed of those noxious irritating qualities, which the imaginations of surgical writers, rather than nature, have conferred upon it? If oily liniments, therefore, be really useful in assuaging the effects of superficial burns, (as I believe them to be,) it is better and more philosophical to be content with saying, that experience proves such efficacy, than to venture into fanciful and unfounded explanations of the fact.

I shall conclude these remarks on superficial burns, with a brief exposition of the kind of practice which is indicated. The inflammation is to be resolved by cold applications, such as cold spring or ice water, snow, lime-water, powdered ice, vinegar, the lotio plumbi acetatis, &c.; or by covering the parts with linen, wet with evaporating spirituous lotions. But, if the burn should be large, situated on the trunk, and accompanied with a tendency to shiverings, or with excessive pain, the local remedies should be of an anodyne and emollient nature. Here the liniment of lime-water and linseed oil, and fomentations, will generally be found better and more

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* Op. cit. t. i. p. 301.

† Thomson's Lectures on Inflammation, p. 592.

agreeable dressings, than refrigerant washes. Small vesications, if not opened, may subside, but larger blisters should be pricked with the point of a needle, and the fluid let out, without removing the cuticle. In general, every superficial burn of much extent, requires antiphlogistic treatment, venesection, mildly aperient medicines, and other means known to be beneficial in relieving inflammation. Opium is also indispensable in every instance attended with much pain, as it not only lessens the suffering, and procures sleep,—but, at the same time, diminishes the disposition to those dangerous convulsions, which carry off a large number of burnt patients. When the injury has been caused by the explosion of gunpowder, the grains are often lodged in the skin, from which they should be delicately removed with the point of a needle.

We come now to the consideration of the mode of treating the third species of burns, or those which suppurate. As Professor Thomson observes, the suppuration in severe cases may take place by the second or third day, but frequently it does not begin till a later period. It often happens without any appearance of ulceration, just as it does from a blistered surface; and, after continuing some time, it is stopped by the formation of a new cuticle. In other instances, small ulcerations appear on the surface, or edges of the burn. These spreading form extensive sores. When suppuration takes place, unaccompanied by ulceration, any mild simple dressings will generally heal the part without difficulty. The applications in most repute, are the liniment composed of linseed oil and lime-water; the unguentum zinci, (Turner's cerate); the unguentum plumbi acetatis; either of which may generally be employed with advantage immediately cold applications cease to produce benefit.

In the other description of suppurating burns, while the injury is in a very painful state, and the ulceration is extending itself, no applications are better than emollient poultices. Afterwards, when this destructive process has stopped, the secretion of good pus begun, and the surface of the ulcer become clean, and covered with healthy granulations, the unguentum zinci, the unguentum plumbi acetatis, or common lint, with a pledget of any simple ointment, may be used as dressings. Should the sore appear to require gentle stimulation, a little of the powder of myrrh and lapis calaminaris may be sprinkled upon it, before the other dressings are applied. No ulcers, however, are so disposed as those of burns, to throw out with surprising rapidity, high fungus-like granulations, over which cicatrization proceeds with slowness and difficulty, and, when completed, leaves the part deformed with several indurated knobs and inequalities. The grand means of preventing this exuberance of the granulations, formerly consisted in the skilful application of pressure, by means of a roller, and in touching the surface of the ulcer with the nitrate of silver, or dressing it with the unguentum resinæ, with every ounce of which ʒj of the pulv. hydrargyri nitrico-oxydi was blended. So freely indeed was this mercurial escharotic employed, that patients were frequently salivated by its absorption, and almost daily teazed with its irritating operation on the sore. But, the improvements in modern surgery have, in a great measure, superseded the necessity for this practice; for, when the situation of a burn is such as to admit of the part being compressed, and the edges of the ulcer approximated with straps of adhesive plaster, it is found, not only that the granulations keep their proper level, but that cicatrization goes on with much greater expedition. The surgeon should always recollect, however, that this is a method which is as improper for burns, which are in a painful irritable state, with the ulceration spreading, as the use of tight bandages, or of caustic itself, would prove under the same circumstances. So various and multiplied, however, are the conditions and appearances of the sores resulting from burns, that a knowledge of this branch of practice implies that of the right method of treating ulcers in general; a subject to which we shall advert in a future chapter. The concretion of parts is to be prevented by the interposition of lint, the introduction of a probe, tube, bougie, or piece of sponge; and the frequent separation of the surfaces likely to grow together. It is particularly necessary to remember this advice, in burns about the toes, fingers, ears, nostrils, &c. When burns are situated near a large joint, like the knee or elbow, the limb should be chiefly kept in the position, in which it would be most useful in the event of an anchylosis taking place. But, every possible effort should be made to avert this unpleasant consequence, by gently moving the joint as soon as the state of the burnt part will allow. Should the evil, however, be unavoidable, the future position of the limb is a very important consideration; and, I need hardly observe, that while the lower extremity is most valuable, in the extended or straight posture, the arm, on the contrary, is most serviceable with the elbow bent. The anchylosis, of which I am speaking, is not what is termed true, but arises partly from preternatural adhesions, partly from long inaction of the muscles and tendons, and partly from the absorption of the granulations, after cicatrization, and the subsequent contraction of the skin. The simple division of such shortened portions of the integuments is rarely succeeded by any permanent removal of the wryness, deformity, and immobility of the parts, and after the wound has healed, things generally fall into the old state again. Whether the proposal suggested by my friend, Mr. H. Earle *, to cut away the cicatrix, bring the sides of the new wound together in a longitudinal line, and maintain the observance of a better position for a certain time, by means of splints and other mechanical aids, will turn out to be a solid improvement, as the cases which he has recorded tend to evince, must be left for the determination of impartial experience.

Burns of this latter kind require, from the first, constitutional as well as local treatment; for, when at all extensive, they are always accompanied with a good deal of symptomatic fever, in which the pulse, instead of being strong, full, and hard, as after most other accidental injuries, is generally small, quick, and vibratory. It is this weakness of the pulse which deters practitioners so much from bleeding: a practice, however, which is indispensable in the early stage of severe cases. Perhaps, indeed, the more frequent use of the lancet in this part of surgery, would form a real improvement. As Dr. Thomson observes, in the dry and hot state of the skin, diaphoretics may be used with advantage. Laxatives are often necessary; but, in general, only the gentler sort should be given, on account of the pain which moving always gives to the patient. Here likewise anodynes are frequently necessary, not only to procure sleep, but an alleviation of pain. During the symptomatic fever, a mild, vegetable farinaceous diet is proper; but afterwards, in the suppurating stages, it is often essential to support the patient with animal food, wine, and cordials. †

With regard to the treatment of the fourth species of burns, or those attended with sloughing, I believe we ought to pursue the same general principles, which should regulate our conduct in the treatment of other cases of mortification. The faith put in the superior efficacy of vinegar, spirit of wine, and the linimentum terebinthinæ, as first dressings for these cases, ought certainly not to be unbounded; and I cannot help thinking, with Dr. Thomson, that in the early stage of many of these injuries; that is to say, while the skin is unbroken and free from ulceration, it matters little whether we apply

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* Medico-Chir. Trans. vol. v. p. 96. and vol. vii. p. 173, &c.

† Lectures on Inflammation, p. 594.

vinegar, spirit of wine, or oil of turpentine. None of these substances then come into contact with any raw, exposed, sensible parts, and, therefore, cannot be supposed to do either much harm, or good, at least, as far as any specific quality is concerned. The evaporation of the vinegar, and spirit of wine, however, will tend to cool the parts, and, on this principle, perhaps may be useful. As for the linimentum terebinthinæ, employed in the manner which Dr. Kentish directs, I entertain exactly the same views of the practice as Professor Thomson of Edinburgh. The turpentine is used only just at first, while it can do no harm; that is to say, while it cannot touch or irritate any raw, or ulcerated surface; and then the applications are gradually altered to a milder description. We may therefore see a reason for the success of Dr. Kentish's method, without placing the least confidence either in the visionary theories which he suggests, or in the alleged superior virtue of the oil of turpentine, as a general first dressing for burns.* With these reflections, I am induced still to profess myself rather an advocate for simple emollient applications in cases of sloughing burns. Common poultices, the liniment of linseed oil and lime-water, and fomentations, are the means which I prefer, until the eschars have separated. The remaining sores should then be treated according to the precepts already hinted at in the present chapter. The constitutional treatment of these cases is precisely similar to that of mortification arising from violent inflammation.

CHAP. XI.

EFFECTS OF COLD.

OF the general exciting, or stimulant power of heat, as a modern writer observes, there can be no doubt. And, with regard to cold, the disputes concerning its operation have been perpetuated only by logical illusion. In common language, we are accustomed to speak of cold as a positive and active energy, while philosophy can acknowledge it only as the expression of a relative decrease of temperature; for any degree of temperature designated by the appellation of cold, is still heat. * A man who, like Baron Larrey, had seen thousands of his countrymen fall victims to the severity of a winter campaign in Russia, might easily be excused for setting down cold as invariably sedative; yet, perhaps, no author, who has drawn a similar conclusion, ever employed more extraordinary arguments. Amongst other circumstances, stated in proof of the correctness of the theory, the *drowning* of the *wounded* prince Poniatouski at Leipsig, is mentioned, as an event which would not have happened, had it not been for the sedative effects of the low temperature of the river, which he attempted to cross. † Yet, what difficulty is there in supposing, that a wounded soldier, trying to get over a deep river, in order to escape from his enemies, might be drowned, according to the plainest and most common signification of such expression? Nor should Baron Larrey have forgotten, with respect to the unfortunate soldiers who died from the severity of the campaign in Russia, that they were not only subjected to extreme cold, but also to the weakening effects of insufficient food, immoderate fatigue, and almost every species of hardship and privation. On the other hand, another person, who adverts only to such objects as Larrey himself has omitted to contemplate, and who entirely overlooks the scenes which this author has so feelingly described, would run into the opposite error of declaring the general effects of cold to be tonic and stimulant. Who would not draw this conclusion, were he to think only of the ordinary effects of moderate cold, as they appear under the advantages of health, youth, strength, proper food, temperate excercise, due clothing, and an unfatigued constitution? The agreeable glow on the skin; the ruddy colour of the countenance; the keenness of the appetite; the regularity of digestion; the feeling and actual possession of increased strength in the whole muscular system; and a variety of other beneficial changes, would allow of no other inference. But, if it be impossible to take at once the extended view of things which the subject demands, let us at all events divest ourselves of these premature exclusive hypotheses; for, nothing is more certain, than that the operation of a similar degree of cold may be extremely different, according to a great variety of circumstances.

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* Some judicious observations on Dr. Kentish's essay may be found in a late publication, entitled "Remarks on Burns and Scalds, chiefly in reference to the Principle of Treatment at the Time of their Infliction," &c. by N. Dickenson; 8vo. London, 1818.

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* Kellie, in Edinb. Med. and Surg. Journ. vol. i. p. 305. The latter part of the above remark may be said to be generally true, with respect to any degree of cold of which we ever speak; though rules for calculating the zero of heat have been given. See Essays on Subjects chiefly Chemical, by W. Irvine, M. D.; 8vo. Lond. 1809.

† Mémoires de Chirurgie Militaire, t. iv. p. 131.

It is now mostly admitted, that cold is nothing real, but only a privation of heat; so that, instead of saying that a body has been cooled to a certain degree, we may say, with equal propriety, that it has been deprived of heat or caloric to that degree. Cold, as I have already remarked, is only a relative expression; and the very same temperature may be called hot or cold, according as it is compared with a colder or a hotter temperature. If we warm one of our hands at a fire, while we cool the other by means of ice, and then plunge both of them into water of the common temperature of the atmosphere, the water will feel cold to the hand which has been heated, and warm to the other, which has been cooled.

A certain quantity of heat is obviously indispensable to the existence of life, throughout both the animal and the vegetable world. The returns of summer and winter alternately multiply and diminish to a great extent the number of living beings, especially of those, which possess a comparatively less perfect organization; and the entire destruction of what are called the hybernating animals would be the consequence of the winter cold, were they not preserved from the danger by an instinct, which leads them to seek situations of shelter often below the surface of the earth; where they lie in a state of torpidity, with a retarded circulation; a slower, or even an entirely suspended respiration; a loss of sensibility and voluntary motion; a suspension of the functions of the stomach; and a remarkable decrease of temperature, Life, however, appears to be incompatible with that degree of cold which produces an entire congelation of the fluids *; a state which is never co-existent with the mere torpidity of an animal, not even when respiration itself is completely suspended, as it may be by means of cold, in the bat, marmot, &c. †

A certain range of temperature (says Dr. Kellie) is adapted to the due performance of the functions of organized beings. This range, however, is not the same for all. It varies with the capacities of different orders of beings, and even of the same orders under different circumstances. Thus, many

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* Notwithstanding the alleged recoveries of frozen persons, there can be no doubt of the truth of this observation, in reference to the whole body, but, in relation to parts only, it is not exactly correct, as will be hereafter noticed.

† Spallanzani, Rapports de l'Air avec les Etres Organisés, t. ii. p. 207. and 215.

vegetables and animals annually perish, or become torpid from a diminution of temperature, which is yet sufficient for the life and activity of a great many others: or, one power of heat, which stimulates the energies of one class of beings, is insufficient for another, with regard to which it is altogether negative. And this, whether we call the particular temperature heat, or cold, is all that can be understood by the appropriated terms, stimulant and sedative. The same temperature is, in this sense, at once stimulant and sedative: stimulant with regard to one order of beings, whose energies are more excitable; sedative with regard to another, whose excitability is less. Stimulant and sedative, however, are not properties of caloric. We cannot, therefore, say that any range of temperature is uniformly stimulant, or sedative; but we know that the effects of the same temperature will be positive or negative, according to the powers and capacities of the organized beings upon which it acts. This capacity of stimulation by caloric varies in different species, in the different individuals of the same species, and even in the same individual at different times. Many vegetables, and some animals, perish, languish, and become torpid in the autumn, under temperatures, by which, in the spring, they were excited to activity and life. Within the limits of each appropriate range of temperature, the life and active vigour of the being is maintained. As the temperature descends, it stimulates less and less, till it reaches at length a point, at which it ceases altogether to have any effect. On the other hand, the temperature, carried too high for the powers of the system, debilitates the individual, and destroys action, which may be again restored by reducing the temperature; and thus the abstraction of caloric invigorates and produces excitement. In this way, says Dr. Kellie, the stimulant power of heat, the sedative operation of cold, and what has been called its tonic power, are true in fact, and mutually reconcileable. *

In living, as well as in dead matter, heat is always transmitted from bodies possessing the largest quantity of it, to such other bodies as come into contact with them, and possess a smaller quantity, until an equilibrium is produced, or until the degree of heat is the same in both. Were living bodies, therefore, possessed of no other properties but those which belong to them in common with inorganic matter, it is obvious that life would cease in an atmosphere of the temperature of

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* Edinb. Med. and Surg. Journ. vol. i. p. 305.

32° of Fahrenheit's thermometer, or a little lower. The animal body, however, is endowed with a power of evolving heat, and this sometimes in a degree much above the ordinary temperature of the atmosphere. This power is even increased according to the necessity occasioned by external cold; and diminishes with the increase of the atmospherical warmth. Thus, during a state of health, the temperature of the more perfect animals is pretty uniformly the same, notwithstanding the great and sudden variations of the atmosphere.[*] As Dr. Reeve observes, man, wherever he is found, has acquired and maintained a superiority in his physical as well as his moral faculties, over the rest of the creation. By means of a more perfect organization, he is enabled to preserve nearly the same temperature under great extremes of heat and cold; and while most of the inferior animals are only found within particular districts of the globe, and in certain conditions, where the temperature and food are suited to their wants, he is seen in every climate under the greatest variety of situations.[†]

This power of generating heat is one of the most curious and inexplicable properties of an animal. It does not depend on the motion of the blood, says Mr. Hunter, as some have supposed, because it likewise belongs to animals which have no circulation. It is allowed, however, that the power is greatest where the circulation is quickest. It cannot be said to depend upon the nervous system; for it is found in animals that have no brain nor nerves. It is true, at the same time, that all that class which possess this power in the highest degree, have the largest brain, although the power is not in the least in proportion to the quantity of brain in that class. As Mr. Hunter adds, it arises most probably from some other principle; a principle so connected with life, that it can and does act independently of circulation, sensation, and volition.[‡] Nor is respiration essential to the process, though it be true that the class of animals which have the largest respiratory apparatus, viz. birds, have the highest temperature. We need no other proofs of this observation than the facts that animals, in a state of torpidity, are always warmer than the surrounding medium, and that their respiration may be so completely stopped that they can be kept for several hours in hydrogen or carbonic acid gas, without the least injury;

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[*] Rees's Cyclopædia, art. *Cold*.

[†] See Reeve's Essay on the Torpidity of Animals, 8vo. Lond. p. 4.

[‡] Obs. on Certain Parts of the Animal Œconomy, p. 104.

while they would soon perish in the same gases, if the temperature were not low enough to produce complete torpor.[*]

In the human body, the degree of heat is regularly about 98° of Fahrenheit's scale; in birds, it is somewhat higher; and in some other animals it is much lower, especially in amphibia, &c. which have been called cold-blooded animals, and whose temperature is not preserved with the same steadiness as that of man, and other animals of more perfect organization.[†] The power which the human body has of generating heat, and even of evolving it with considerable rapidity, is fully demonstrated by many ordinary and accidental circumstances. In the winter season of this climate the body retains its natural temperature of 98°, during an exposure to an atmosphere of 10, 15, or 20 degrees below the freezing point. In Russia, as Mr. Tooke remarks, the drivers and their horses feel little or no inconvenience in pursuing their employment during extreme cold, when the thermometer is from 20° to 24° below the zero of Reaumur, and women will stand rinsing the linen through holes in the ice, four, five, or six hours together, often bare-footed, with their hands dipping in the water all the while, and their draggled petticoats stiff with ice.[‡] The well-authenticated instances in which persons have been dug alive out of snow, in which they had lain buried several days, (cases to which I shall presently revert,) are convincing proofs of the faculty which the human body has of resisting great external cold by the production of heat within itself.[§] But if stronger evidence were wanted, it might be obtained from the histories of persons who have survived the most intense winter cold at Nova Zembla, in Hudson's Bay, and in Siberia; cold which even caused the bears to be seen no more, the white fox alone being left with man.*

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[*] Spallanzani, Rapports de l'Air avec les Etres Organisés, t. ii. p. 207.

[†] See Hunter on Animal Œconomy, p. 102, 103.

[‡] Tooke's View of the Russian Empire, vol. i.

[§] Curious as this faculty is, it is not more so than the power which the human body has of retaining nearly its ordinary temperature, while exposed to very high degrees of heat. At Bussorah, while the thermometer stood at 115° in the shade, a remittent fever was the only epidemic disease. In Finland and Russia the inhabitants expose themselves in vapour-baths to a temperature of 110° and 140°, without having the temperature of their bodies raised above 104°, and without injury. A baker's maid-servant could venture into an oven heated to 276°, and stay there a quarter of an hour; and Duhamel and Dutillet remained nearly five minutes in a temperature equal to 290° of Fahrenheit. These experiments have been confirmed by Sir Ch. Blagden, Dr. Fordyce, and others who remained a long time in very high temperatures, without the temperature of their bodies being raised more than three or four degrees. See *Reeve's Essay on Torpidity*, p. 67.; *Duhamel, Supplement au Traité de la Conservation des Grains. Dutillet, Traité du Degré de Chaleur auquel les Hommes et les Animaux résistent.*

Such is this power, indeed, that an atmosphere of the temperature of 98°, which of course does not abstract any of the heat of the body, is extremely incommoding to the feelings. In a physical sense, every temperature of the air, or other surrounding medium, below 98°, might be denominated cold; but with regard to the feelings and the health, a degree much lower, namely, from 60° to 65°, is the most grateful and invigorating. The external medium at the temperature of about 62° appears to abstract the heat of the body in the same proportion in which it is generated, without any extraordinary exertions of the system; and, therefore, neither contributes to exhaust its powers, nor to excite uneasy sensations. Thus the constitution of man is wisely adapted to the general or medium temperature of the habitable globe. Hence, also, the denominations of temperate, warm, hot, cool, and cold, are given to particular degrees of the thermometric scale. There is, however, considerable difference among men, even in a state of health, in assigning names to certain temperatures, as their sensations vary, according to the power which their respective constitutions possess of evolving heat. This depends much upon the original vigour of the system, especially of the heart and arterial system. It is also much influenced by habit, or (as the phrase runs) by a person's being seasoned to the cold. Hence people who from vigour of constitution, or from habit, readily evolve a considerable quantity of heat, especially during moderate exercise, can bear with pleasure and benefit to their health, the very same degree of cold, which to the weak and unhabituated, is a source of painful chilliness.†

Respecting this highly interesting topic, an observation has been recently made, which is curious and different from commonly-received opinions. In the late disastrous campaign of the French armies in Russia, it was observed that individuals of a brown complexion, mostly born in the southern provinces of Europe, bore the severity of the cold better than fair persons, almost all of whom were born in northern countries. "Thus (says Baron Larrey) the Dutch soldiers of the third regiment of grenadiers of the guard, consisting of 1787 men, officers, and soldiers, nearly all perished, without exception, as two years afterwards only 41 of them, including their colonel, General Tindal, who was wounded, had returned to France; while of the two other regiments of grenadiers, composed of men nearly all of whom were born in the south of France, a considerable number was saved. The Germans also lost in proportion to their number many more men than the French. Several of our physicians who were left at Wilna, assured me that the cold destroyed a much larger proportion of the coalition, out of a given number, than of the French, though the former were better provided with the means for preserving themselves from this destructive agent, than our unfortunate countrymen. These, robbed of their clothes by the Cossacks, and compelled to move from one place to another in a more or less complete state of nudity, did not generally resist the injuries of the glacial atmosphere the less, and by dint of courage and exertion kept themselves from being entirely frozen." *

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* Zimmerman's Zoologie Geographique.

† Rees's Cyclopædia, art. *Cold.*

The first effect of certain degrees of cold applied to the human body is to retard and weaken the circulation through the small cutaneous vessels, more especially those which are situated in extreme parts, like the hands and feet; or, in projecting parts, as the ears, nose, scrotum, &c. which expose a larger surface to the atmosphere, or medium, by which their caloric is abstracted. Hence the skin becomes pale, and contracting round the miliary glands and roots of the hairs, exhibits a roughness which is compared to the skin of an unfeathered goose, and is technically named the *cutis anserina.* By severe degrees of cold the size of extreme parts is said to be so considerably lessened, that rings, which are tight when the body is warm, drop off the fingers, and even shoes fall off the feet. The action of the heart and arteries in general becomes weakened; and the blood being partially delayed in its course through some of the cutaneous vessels, and not undergoing the change of colour, which a circulation through the lungs produces, it gives a bluish or livid colour to the fingers, ears, and other projecting parts. If the cold be intense, or the exposure long continued, the circulation in the extreme parts becomes altogether interrupted, and the power of evolving heat being completely destroyed, mortification is the consequence. Parts killed in this manner are said to be *frost-nipped*, or *frost-bitten*; a subject which I shall presently consider more in detail.

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* Larrey's Mém. de Chir. Militaire, t. iv. p. 125. 8vo. Paris, 1817. Also, p. 136., where it is stated that the French, Portuguese, Spaniards, and Italians lost much fewer men than the Germans and Dutch, most of whom were destroyed by the cold of Siberia, after being made prisoners, and conveyed to that severe climate.

From the languor and weakness of the arterial system, produced by the application of cold, other effects on the constitution necessarily accrue. A free circulation of well-oxygenated blood seems essential to the perfect execution of the functions of the brain and nervous system, and to the support of sensibility. If the circulation is suspended for a few moments, as in syncope, the sensibility is also suspended; and, on the other hand, when there is more than an ordinary supply of blood to any part, as in inflammation, the sensibility is highly augmented. Hence another immediate effect of the agency of cold on the human body, is a diminution of the sensibility of parts. This is universally felt in the numbness of the hands and fingers, which, under the impression of cold, are altogether incapable of accurate discrimination of touch; and the whole of the surface of the skin partakes of the imperfect feeling. The tongue is also incapable of distinguishing the peculiar flavour of sapid bodies, if they be extremely cold; and the sense of smell is considerably enfeebled by cold. If the cold be intense, or its application long-continued, the powers of the whole nervous system yield; a torpor of the animal functions ensues; the action of the muscles becomes feeble, and scarcely obedient to the will; an unconquerable languor and indisposition to motion succeed; and drowsiness comes on, ending in sleep, from which the person, unless speedily roused, frequently awakes no more. *

The strong propensity to sleep, following the anxiety and lassitude experienced at an earlier period, is noticed by most writers as the precursor of imminent danger †; and it is certainly a symptom of usual occurrence. But, as an intelligent author remarks, it is doubtful how far the state of sleep is the necessary consequence of simple exposure to cold; or, at least, what other circumstances besides cold are necessary for its production, since this exposure may be made to an intense degree of cold for a considerable length of time, without sleep being induced. ‡ The case of Elizabeth Woodcock §, who lay buried under snow more than a week without sleeping a great deal, and those of some shipwrecked sailors, who were more or less immersed in water, in severe weather, for 23 hours, without being seized with drowsiness, are proofs that an irresistible propensity to sleep is not constant. *

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* See Rees's Cyclopædia, art. *Cold*, and a description of the effects of the cold at Terra del Fuego, on the persons who landed there with Dr. Solander and Sir J. Banks, as detailed in Captain Cook's first voyage.

† Richter, Anfangsgr. der Wundarzn. b. 1. p. 117. Larrey, Mém. de Chir. Mil. t. iv. p. 106. Callisen, Syst. Chir. Hod. pars i. p. 308.

‡ Thomson's Lect. on Inflammation, p. 624.

§ Reeve's Essay on Torpidity.

Baron Larrey, in describing the manner in which many of the French soldiers perished from the severity of the cold in Russia, remarks, that their death was preceded by a paleness of the countenance, by a sort of idiotism, difficulty of speech, weakness of sight, and even a total loss of these faculties. In this state, some of the men continued to march for a greater or lesser time, led by their comrades. The action of the muscles gradually grew weaker; the men reeled about as if they were drunk; and their debility increased until they fell down, a certain sign of the total extinction of life. The incessant and rapid march of the troops in close masses obliged those who could not bear it to quit the centre to walk along the side of the road. Separated from this compact column, and left to themselves, they soon lost their equilibrium, and fell into the ditches of snow, from which it was hardly possible for them to get out. Here they were immediately seized with a painful numbness, followed by lethargic drowsiness, and in a few minutes their miserable existence terminated. Frequently, before death, there was an involuntary emission of urine, and sometimes hemorrhage from the nose. Almost all the men who perished in this manner were found lying with their faces downwards. The skin was without alteration of colour, or any appearance of gangrene. In general, death took place more or less rapidly, according as the subject had been fasting a longer or shorter time. Larrey thought it not improbable, that at the final moment the heart was struck with paralysis, and that the functions of all the organs of life ceased at the same instant. † Others, however, ascribe the immediate cause of death to the determination of blood to the internal organs, especially to the brain, and infer that persons who fall victims to cold in reality die apoplectic. ‡

It has been a question whether the human body, after being frozen, can ever be restored to life. Richter asserts the possibility of recovery, *when the blood in the heart itself is not turned*

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* Phil. Trans. 1792, and Currie's Med. Reports on the Effects of Water, vol. i. chap. 15.

† Larrey, Mémoires de Chir. Militaire, t. iv. p. 127—129. His description, however, is rather that of people dying from the combined effects of cold, hunger, and fatigue, than from cold alone.

‡ Richter, Anfangsgr. b. 1. p. 118.

into ice; when this organ and large blood-vessels still retain a degree of vitality; and there is no extravasation in the brain to render the thing impracticable. And he declares, that persons who have lain in a frozen state as long as four and six days, have been restored to life.[*] After a full consideration of this subject, I think there can be no doubt that Richter is in error; and that the cases of recovery to which he adverts, were only instances of restoration from a state in which the suspension of sensation, voluntary motion, &c. was induced by cold, and not examples in which the whole body, or even the greater part of it, had actually been frozen. In order to ascertain the truth or falsity of an assertion, that some animals, especially serpents and fish, can recover their vitality after being frozen, Mr. John Hunter instituted a number of interesting experiments on the power of different animals in resisting the agency of cold. Carp was gradually destroyed and frozen, when submitted to a freezing mixture at 10° Fahrenheit, and did not recover. It was with great difficulty that he succeeded in freezing a dormouse, such were its powers of evolving heat, and the non-conducting quality of its integuments; and it was not till the hair had been wetted that life was destroyed. This animal also did not recover. When a toad was exposed to a similar cold mixture, the water froze round the animal so as to enclose it, but without destroying life: yet, though not frozen, it hardly ever recovered the use of its limbs. The conclusion drawn from these experiments was, *that an animal must be deprived of life before it can be frozen.*[†] We learn from Professor Thomson, that in the year 1785, a variety of experiments were made at the Royal Medical Society of Edinburgh, with a view to discover some of the effects which exposure to intense degrees of cold produces upon warm-blooded animals. In these experiments it was uniformly observed that death took place long before the irritability of the heart and other internal parts was destroyed, and at a time when the temperature of the blood, circulating in the heart and larger blood-vessels, was but little, if at all, reduced below 60° of Fahrenheit.[‡] Whoever will advert to any of the most remarkable examples on record, where persons have recovered after being exposed for a length of time to extraordinary cold, will find that the particulars by no means justify the conclusion that such cases were instances in which the whole body, or the greater part of it, had been frozen. We may be sure that this did not happen in the case of Elizabeth Woodcock, who lay buried six feet under the snow, and without food, from Saturday Feb. 2d to Sunday Feb. 10th, 1799; for it is expressly related that she was sensible the whole time*; a state which cannot be supposed to be compatible with a general congelation of the blood, and other fluids in the system. The French peasant Boutillat was lost in a snow storm on the black mountains, which separate France from Spain, and lay asleep under the snow four days; but on the fifth morning he awoke with a sensation of thirst. How could this return of sense and intellect have happened, had the whole mass of the blood been in a frozen state? Or, if it be thought that the fluid was in a state of congelation only while the man lay asleep and senseless, by what alteration of circumstances is the thawing of the blood to be accounted for, since he awoke buried under the snow, breathing through a hollow cone, which, as in the instance of Elizabeth Woodcock, extended from his body to the surface of the snow.† Nor could the circulating fluids have been frozen to a great extent in three other individuals, whose remarkable case is upon record, since, in such condition, they would not have been in constant dread of being starved.‡ The very existence of sensation and intelligence proves, that in none of these cases a completely frozen state of the body, or of the blood, could have taken place. Had this last state been induced, no doubt recovery would have been out of all possibility, notwithstanding the contrary sentiments which have been published on this point, by Fabricius Hildanus, Richter, &c. §

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[*] Vol. cit. p. 119.

[†] See Philosoph. Trans. vols. lxv. and lxviii.; and Hunter on Certain Parts of the Animal Œconomy, p. 100, 101.

[‡] Thomson's Lect. on Inflammation, p. 642.

TREATMENT OF PERSONS IN A STATE OF TORPOR OR SUSPENDED ANIMATION FROM COLD.

One great principle, insisted upon by practical writers, is to let caloric be communicated to the body in the most gradual manner.* From observations and experiments (says Mr. Hunter), it appears to be a law of nature, in animal bodies, that the degree of external heat should bear a proportion to the quantity of life. When life is weakened, this proportion must be adjusted with great accuracy, but, when the powers of life are considerable, a greater latitude is allowable. "I was led (he observes) to make these observations, by attending to persons who are frost-bitten, the effect of cold in such cases being that of lessening the living principle. The powers of action remain as perfect as ever, but weakened, and heat is the only thing wanting to put these powers into action; yet, that heat must at first be gradually applied, and proportioned to the quantity of the living principle, which increasing, the degree of heat may likewise be increased. If this method is not observed, and too great a degree of heat is at first applied, the person, or part, loses entirely the living principle, and mortification ensues. Such a process invariably takes place with regard to men: and the same thing, I am convinced, happens to other animals. For, if an eel is exposed to a degree of cold, sufficiently intense to benumb it till the remains of life are scarcely perceptible, and still retained in a cold of about 40°, this small proportion of living principle will continue for a considerable time, without diminution or increase; but, if the animal is afterwards placed in a heat about 60°, after shewing strong signs of returning life, it will die in a few minutes. Nor is this circumstance peculiar to the diminution of life by cold. The same phænomena take place in animals, which have been very much reduced by hunger. If a lizard or snake, when it goes to its autumnal hiding place, is not sufficiently fat, the living powers are, before the season permits it to come out, very considerably weakened, perhaps so much, as not to admit of the animal being again restored. If animals in a torpid state are exposed to the sun's rays, or placed in any situation, which by its warmth would give vigour to those of the same kind, possessed of a larger share of life, they will immediately shew signs of increased life, but quickly sink under the experiment, and die; while others, reduced to the same degree of weakness, as far as appearances can discover, will live for many weeks, if kept in a degree of cold proportioned to the quantity of life they possess. "I observed many years ago, (says Mr. Hunter,) in some of the colder parts of this island, that, when intense cold had forced blackbirds or thrushes to take shelter in outhouses, such of them as had been caught, and were, from an ill-judged compassion, exposed to a considerable degree of warmth, died very soon."*

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* Reeve's Essay on Torpidity, p. 109.

† Pilhes, in Journ. de Médécine, Paris, 1767, tom. xxvii.

‡ Narrative of three women saved, who were buried 37 days under the snow, in a stable at Bergemoletto in Italy, by F. Soumis, 12mo. 1759.

§ For many judicious observations on this topic, consult Thomson's Lect. on Inflammation, p. 642—644.

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* Richter, Anfangsgr. b. i. p. 123. Callisen, Syst. Chir. Hodiern. t. i. p. 309.

I have deemed it advisable to cite these sentiments of Mr. Hunter, with some of the facts upon which they are founded, in consequence of my having lately read, in some modern works of high repute and extensive circulation, that, in cases of suspended animation, or torpor from cold, the patient may be safely brought into a warm, but well ventilated room, chafed with warm flannels, and his feet and legs immersed in warm water.† Dr. Kellie does not think the same caution and reserve necessary in the application of heat to a case of general torpor, as to benumbed and frost-bitten limbs. In the latter occurrence, he admits, heat should be very gradually communicated, but (says he) surely we would not commence the treatment of a case of general torpor, nearly approaching to death, by applying snow to the body. He argues, that there does not appear to be the same danger of violent re-action, or of destroying by premature stimulation, an accumulated excitability in general torpor, where the sensorial functions have been all along suspended, as in a partial affection, where notwithstanding the injury done to the part, the general powers of the system have remained excitable. Notwithstanding the ingenuity of the reasoning which Dr. Kellie has adopted, I am far from thinking the practical principles, to which the observations of Mr. Hunter tend, are at all erroneous. The case related by Dr. Kellie was not an example in which the vital powers were reduced altogether by cold. The temperature to which the individual had been exposed, was not indeed depressed to a degree generally incompatible with activity and life, but he was reduced by fatigue and fasting, and the effects of the atmospheric cold were increased by the drizzling rain which fell. The blood which flowed from the arm, was judged to be of its natural temperature. This was therefore a case in which the temperature of the patient could hardly have been low enough to afford any criterion of the safety or danger of suddenly exposing a person to much warmth, who has been subjected to the effects of intense cold. If the facts mentioned by Hunter had left this matter doubtful, we might still be convinced of the truth of his observations by other events upon record. The limbs of the peasant Boutillat, whose case I have already noticed, were covered with warm linen, dipped in aromatic liquors; his feet mortified, and he lost his life. These consequences, Dr. Pilhes thinks, might have been avoided by the use of cold applications.* The ample experience of Larrey, who was an eye-witness of all the disasters of Napoleon's campaign in Russia, appears also to confirm the truth of the principle inculcated by Hunter, Richter, Callisen, &c. In describing the sufferings of the French army from the rigour of the climate, Larrey exclaims, "Woe to the man benumbed with cold, whose animal functions were nearly exhausted, and especially whose external sensibility was destroyed, if he entered too suddenly into a warm room, or came too near the fire of a bivouac! The prominent parts, benumbed or frozen at a distance from the centre of the circulation, were seized with gangrene, which made its appearance at the very instant, and spread with such rapidity, that its advances were perceptible by the eye, or the individual was suddenly suffocated with a kind of turgescence, which appeared to affect the brain and lungs: he perished as in asphyxia. Thus died the chief apothecary of the Guards. He had arrived at Kowno without any accident, but his strength was much reduced by cold and abstinence. An asylum was offered him in a warm apartment in the pharmacy of the hospital. He had scarcely been a few hours in this atmosphere, so new to him, when his limbs, in which he had lost all feeling, became considerably swelled, and he expired soon afterwards in the arms of his son and one of his colleagues, incapable of uttering a single word. We saw some individuals fall down stiff-dead in the fires of the bivouacs," &c.†

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* Observations on Certain Parts of the Animal Œconomy, by J. Hunter, 4to. p. 137. 2d edit. Lond. 1792.

† Kellie, in Edin. Med. and Surgical Journ. vol. i. p. 312. Rees's Cyclopædia, art. *Cold.*

In describing the treatment of a person in a state of torpor, or suspended animation from cold, Callisen and Richter rigorously adhere to the principle, that caloric should be very gradually communicated to the body. The former recommends long-continued frictions with snow, or cloths wet with very cold water. This is to be done in a cold room, and he advises the surgeon not to let his endeavours cease too soon, as patients, after lying without signs of life for several days, have yet been snatched from the jaws of death. On the return of sense, motion, and warmth, aromatic spirituous applications may be externally used; the temperature in which the body is placed may be raised, and cordials at the same time administered.[*] Richter advises us even to cover the body with snow, or lay it in ice-cold water, in such a manner that the mouth and nostrils be not obstructed, care being taken not to break any frozen part. Signs of vitality are then to be awaited; when these appear, strong volatiles and sternutatories are to be applied to the nostrils, and air is to be blown into the lungs. The fauces are to be tickled with a feather. He also recommends the introduction of tobacco-fumes up the rectum, a practice, however, the propriety of which is questionable in all cases of suspended animation, on account of the well-known noxious, debilitating, and even deleterious effects of that plant. It might be better, perhaps, to throw warm wine into the large intestines, or inject it by means of a hollow bougie down the œsophagus. When the signs of returning animation increase, Richter directs us to remove the body from the water, rub it with diluted brandy, and convey it into a warmer situation. A diaphoretic drink is then to be given, and, as soon as the patient has been well dried, he is to be put to bed, and remain there till he begins to sweat.[†]

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* Journ. de Médécine, tom. xxvii.

† Mém. de Chir. Mil. tom. iv. p. 134, 135.

Possibly these eminent surgeons may have extended the principle too far in directing the body to be at first covered or rubbed with snow. But I think we have every reason to believe, that their method of allowing the heat to be communicated only by degrees, is the most likely to be conducive to recovery. We should also recollect, that Callisen and Richter lived in cold northern countries, where correct information respecting this particular subject might be more easily obtained than in Great Britain. The residence of the former at Stockholm, the capital of a very cold country, and his acknowledged talents and impartiality, seem to confer peculiar importance upon the few remarks which he has offered, on the topic now engaging our attention.

A late author, however, who dissents from the principle of letting caloric be communicated only in a very slow way, gives it as his opinion, that the patient may be brought into a warm, but well ventilated room, and gently rubbed with warm flannels. The feet, he adds, may be immersed in tepid or warm water. The action of the diaphragm and the heart, he says, is most readily excited by warmth and other stimuli applied to the pit of the stomach. The good effects of ammonia, thus used, are particularly extolled. The same thing, or some other stimulant applied to the nostrils, is also commended; and, when the patient can swallow, he is to be given, from time to time, some warm and gently stimulating drink. *

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[*] Callisen, t. i. p. 509.

[†] Richter's Anfangsgr. b. i. p. 125.

OBSERVATIONS ON THE TREATMENT OF PARTS WHICH ARE FROZEN.

As in all the experiments which Mr. Hunter made upon the freezing of whole animals, he had never seen life return by thawing, he was desirous of ascertaining how far parts were similar to the whole in this respect, it having been asserted, that portions of the human body may be frozen, and afterwards recover. He froze the ears of rabbits, and the combs and wattles of cocks, till the parts were so stiff and hard, that when cut, they flew from the blades of the scissars like a chip, and no pain nor bleeding ensued. After being thawed, they inflamed considerably; but, in the end, perfectly recovered. There was thus a material difference in the result of the experiments which Mr. Hunter made on the whole of some of the more perfect animals, and on parts of them. But, though it was thus fully proved, that parts of such animals might be frozen, and restored to their natural state, it was not known whether this would happen in the more imperfect animals. Mr. Hunter therefore froze the tails of a tench and two goldfishes, and endeavoured to restore the vitality of the parts, by putting the fish into cold water; but the tails, when thawed, did not resume their original appearance, the fish were suspended with their heads perpendicularly downwards, and they ultimately died. All his other trials to restore the life of other cold-blooded animals, or of parts of them, after they had been frozen, also entirely failed. † Spallanzani found, that the irritability of the muscles of frogs, toads, and lizards was not destroyed by keeping these animals a good while in snow; but that, if the cold was increased, so as to freeze any part of them, the frozen part was invariably killed, and rendered insensible to stimuli. ‡

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* Kellie, in Edinb. Med. and Surgical Journal, vol. i. p. 312, 313.

† Obs. on certain Parts of the Animal Œconomy, p. 124, 125.

‡ Opuscules de Physique, t. i. p. 118.

The experiments, however, on warm-blooded animals tended to corroborate what has long been believed, that when a part of the human body is simply frozen, without any impairment of its organization, it may often be recovered by the *gradual* communication of caloric to it. What parts of the human body admit of being frozen, without the destruction of life, and how long they may remain in this state with impunity, (as Dr. Thomson remarks,) are points, which observation does not hitherto appear accurately to have determined: but we know, that portions of the cheeks, ears, and nose, have often been frozen by exposure to cold, and yet, that by a proper management the vital functions of these parts have been restored. It seems probable, therefore, that a small part of the cutaneous texture may be frozen for a short period, without the necessary destruction of its vitality. But Dr. Thomson considers the restoration of a frozen limb a matter of impossibility; and in the course of his reading, he has not met with a single unequivocal instance of such an * event. On this point he differs from Callisen and Richter, quite as much as upon the other question of the possibility of reviving the whole body, after it has been frozen. Whatever doubts may have been suggested concerning the propriety of keeping patients out of a warm temperature, who are in a state of torpor and insensibility from cold, none exist with respect to the prudence of extending this principle to the treatment of very cold, or actually frozen parts of the human body. If a limb, that is not indeed frozen but excessively cold, be suddenly warmed, chilblains, frostbite, and other more extensive forms of inflammation, are the result. The part swells, turns livid, and becomes affected with insupportable darting pain. And when a part actually frozen is thus quickly warmed, the same symptoms arise, but in an aggravated degree, and rapidly end in mortification. †

In this chapter, I have already cited some facts ‡, strongly illustrative of the danger of exposing very cold, or frozen parts to the fire; but perhaps on no occasion has the thing been more forcibly proved, than in the campaign of the French army about the period of the battle of Eylau. During the three or four severely cold days previous to this action, the mercury had fallen to 10, 11, 12, 13, 14, and 15 degrees below the zero of Reaumur's thermometer, and yet, until the second day after the battle, not a single soldier complained of any accident from the effect of the cold. "We had, however, (says Larrey,) passed these days, and a great part of the nights of the 5th, 6th, 7th, 8th, and 9th of February in the snow, exposed to the most inclement frost." In the night, however, between the 9th and 10th, the temperature suddenly rose to 3, 4, and 5 degrees above zero, accompanied with sleet. A thaw then commenced, and, from this moment, numerous soldiers began to complain of acute pain in their feet, numbness, sense of heaviness, and annoying pricking pains in their limbs. The parts were but little swelled, and of a dark red colour. In some individuals, a slight redness was observed at the base of the toes, and upon the instep; while, in others, the toes had lost all power of motion, all sensation and warmth, and become black and dried. These patients, without exception, declared, that they had felt no uneasiness while the severe cold lasted, and that their complaints first began at the commencement of the thaw. From these facts, Larrey argues, that cold is not an exciting, but only a predisposing cause of inflammation and gangrene*; a truth which Richter appears to have been well aware of, when he observes, that cold alone, even the most intense, will never produce chilblains.†

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* Lectures on Inflammation, p. 628. 642.

† Richter, Anfangsgr. der Wundarzneykunst, b. i. p. 120.

‡ From Larrey's Mém. de Chir. Mil. t. 4.

In order to thaw a frozen part gradually, it is best to rub it with snow, until sensibility and motion return. If the ear, or tip of the nose, be the part concerned, care must be taken to avoid breaking it. When snow is not at hand, ice-cold water should be used instead of it. As soon as marks of sense and motion are discerned, the frictions may be made with brandy, or camphorated spirit of wine. It is then generally considered advantageous to let the patient have some gently diaphoretic drink, such as a little mulled wine, a basin of tea, &c. and he may now be put to bed, in a chamber where there is a fire. In this situation he is to remain until he begins to perspire, when a perfect recovery of whatever sensibility may have been lost generally succeeds.

When a part is almost in the state of gangrene, in consequence of improper exposure to sudden heat, sometimes its recovery may still be accomplished by immersing it in water of a temperature nearly as low as the freezing point. The part must be kept immersed, until the swelling, pain, and marks of discolouration begin to diminish, when frictions with brandy, &c. may commence, and the warmth be gradually increased.

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* Mémoire sur la Gangrène sèche causée par le Froid, &c. in op. cit. t. ii. p. 60.

† Richter, b. i. p. 124.

This plan occasionally succeeds in almost hopeless circumstances. If mortification cannot be avoided, the future treatment does not differ from what has been explained in the chapter on that subject. In this case, however, opium is alleged to be pre-eminently useful, both as an external and internal remedy. *

CHILBLAINS.

A chilblain, in the mild stage, is a moderately red tumour, occasioning heat and itching. The complaint after a time spontaneously disappears.

In a more severe state, the tumour is larger, redder, and sometimes of a dark blue colour. The heat, itching, and pain are so vehement, that the patient cannot use the part.

In the third degree, small vesicles arise on the tumour. These burst, and leave excoriations, which soon change into sores. The ulcers secrete a thin matter, penetrate deeply, and are very slow in healing.

In the worst cases, the inflammation ends in mortification, which is often preceded by the formation of bloody vesicles on the tumour.

The sudden warming of a cold part, and the sudden cooling of a heated part, seem particularly conducive to chilblains; hence, parts most exposed to the vicissitudes of heat and cold are most subject to the complaint; as, for instance, the toes, fingers, nose, ears, and lips. When a part is exposed to sudden cold, while it is in a state of perspiration, it is more likely to be affected with chilblains than when thus exposed while simply warm. The most intense cold alone cannot produce true chilblains, though analogous complaints do remain in limbs which have been frozen. The more irritable and tender the skin is, the more readily the complaint arises. Children, especially such as are subject to scrophula, young persons, females, and all who are brought up tenderly, who keep themselves warm, and unexposed to the air, and who perspire much in the feet, are particularly liable to chilblains.

One of the best applications to chilblains of the first and second sort, is ice-cold water. The part affected is to be im-

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* Richter, Anfangsgr. &c. b. 1. p. 122. Callisen, Syst. Chir. Hodiern. vol. i. p. 308.

mersed in it a few minutes, two or three times a day, until the complaint quite disappears. This event usually happens in less than four days. After every application the part is to be well dried, and covered with leather socks.

In some cases, tonics and astringents have had the best effect, such as diluted muriatic acid; the saturnine lotion; spir. vini camph.; tinct. myrrhæ; the alum lotion, and vinegar. In other instances, oleum terebinthinæ mixed with the balsam. copaivæ; the linimentum camphoræ; and a mixture of two parts of spir. vini camph. and one part of liquor plumbi acet. have proved the best applications.

Suppurating chilblains require topical stimulants, such as warm vinegar; a mixture of liquor plumbi acet. and aq. calcis; or a salve containing the hydrarg. nitrico-oxydum; and frequently it is necessary to touch the ulcers with the argentum nitratum.

Gangrenous chilblains must be treated according to the rules explained in the chapter on mortification.

CHAP. XII.

WOUNDS.

BY a wound, surgeons imply a recent, suddenly-formed breach in the continuity of the soft parts, attended at first with hemorrhage, and generally produced by an external mechanical cause.

There are some writers who object to defining a wound to be a *recent* and *bleeding* division of the soft parts, and Richerand is one of them. He disapproves of these terms, because a wound, when long in healing, and accompanied with suppuration, cannot admit of such a definition. And he observes that writers, who have defined a wound in this way, have been obliged to call every suppurating wound, if only of three days' standing, an ulcer, which he conceives to be altogether absurd. The epithet *bleeding*, he contends, is not applicable in a general definition of wounds, since gun-shot wounds are often unattended with hemorrhage. *

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* Richerand, Nosographie Chir. t. i. p. 2. edit. 4. Some of the remarks contained in this chapter were originally inserted by the author in Dr. Rees's Cyclopædia, art. *Wounds.*

It must be acknowledged that some difficulty occurs in fixing the precise period when a wound should cease to be so denominated, and take the appellation of an ulcer. The wounds, after several important surgical operations, are sometimes a month or two in healing; yet, generally speaking, as long as there is a prospect of a cure within a reasonable space of time, and the cicatrization does proceed, though slowly, surgeons mostly still call the suppurating breach of continuity a wound, and not an ulcer. When, however, a wound is very long kept from healing by injudicious applications, constitutional causes, attacks of hospital gangrene, &c. I think the case is mostly regarded rather as a sore, or ulcer, than as a wound. An ulcer, strictly so called, does indeed seem to imply a breach of continuity, arising from the process termed *ulceration*, or *ulcerative absorption*, in which a chasm, or loss of substance, is actually produced in the part by the action of the absorbent vessels. This process is also concerned in the production of every sore which is the consequence of a burn; for though parts may be at once killed, and converted into eschars by the fire itself, yet the separation of such deadened parts, or sloughs, so as to leave an ulcer behind, is always the result of a process in which the absorbents of the adjoining living surface remove the particles of matter forming the bond of connection between the dead and living parts.

In the perusal of Richerand's sentiments, who has betrayed so much delicacy and so many scruples about the admission of definitions, and who is at the same time the author of a modern system of physiology, I confess I was rather surprised to find him insisting upon burns, and the apertures by which abscesses spontaneously burst, being wounds, and not ulcers. In fact, he seems to regard the formation of a breach of continuity, in these cases, as entirely the effect of mechanical causes, and not as the consequence of a vital process, in which the action of the absorbent vessels has a principal share. With respect to the propriety of the epithet *bleeding*, in the definition of a wound, there cannot be any real objection to it in a general sense; for although a wound in a suppurating state does not bleed, yet it almost always has done so on its first occurrence. Even the generality of gun-shot and other contused wounds, though it may not be their usual nature to bleed much, are rarely, perhaps never, seen entirely exempt from hemorrhage.

I have stated that wounds are produced by external mechanical causes. There are, however, exceptions to this remark; for it sometimes happens that breaches of continuity, both in the soft and hard parts, are suddenly caused by the violent action of the muscles, which either tear themselves asunder, break the bones, or rupture the tendons with which they are connected. Sometimes, also, the sharp point of a broken bone wounds the superincumbent integuments, and changes the case into a compound fracture. Here we see that the cause is mechanical, but, yet, not of an external kind, as in ordinary examples.

Wounds are divided by the writers on surgery into several kinds, the distinctions being founded either upon the sort of weapons with which the injury was inflicted, or upon the circumstance of a venomous matter having been inserted into the part; or, lastly, upon the particular situation of the wound, and the nature of the wounded parts themselves. Hence we have *cuts*, *incisions*, or *incised wounds*, which are such as are produced by sharp-edged instruments, and are generally free from all contusion and laceration. The fibres and texture of the wounded part have suffered no other injury but their mere division, and there is consequently less tendency to inflammation, suppuration, gangrene, and other bad consequences, than in the generality of other wounds. Incised wounds also may usually be healed with greater quickness and facility than others, which are more or less contused or lacerated: the surgeon has only to prevent the solution of continuity from gaping, or, in other words, he has simply to bring the opposite sides of the wound into contact with each other, and keep them in this state a few hours, and they will unite and grow together.

Another class of wounds are *stabs*, or *punctured wounds*, caused by the thrust of pointed weapons, like bayonets, lances, swords, daggers, &c., and also by the accidental and forcible introduction of considerable thorns, large nails, &c. into the flesh. These wounds frequently penetrate to a great depth, so as to injure large blood-vessels, nerves, viscera, and other organs of importance; and as they are generally inflicted with much force and violence, the parts suffer infinitely more injury than what would result from their simple division. It should also be noticed that a great number of the weapons, or instruments, with which stabs are inflicted, increase materially in diameter, from the point towards their other extremity; and hence, when they penetrate far, they must force the fibres asunder, like a wedge, and cause a serious degree of stretching and contusion. It is on this account that bayonet wounds of the ordinary soft parts are very often followed by violent inflammation, extensive swelling, large abscesses, fever, delirium, and other very unfavourable symptoms. The opening which the point of such a weapon makes, is quite inadequate for the passage of the thicker part of it, which can only enter by forcibly dilating, stretching, and otherwise injuring the fibres of the wounded flesh.

A third description of wounds are the *contused* and *lacerated*, which strictly comprehend, together with a variety of cases produced by the violent application of hard, blunt, obtuse bodies to the soft parts, all those interesting and common injuries denominated *gun-shot wounds*. Many bites also rank as contused lacerated wounds. In short, every solution of continuity which is suddenly produced in the soft parts by a blunt instrument, or weapon, which does not operate by means of a sharp edge, or point, must be a contused or lacerated wound.

Poisoned wounds are those which are complicated with the introduction of a venomous matter, or fluid, into the part. Thus the stings and bites of a variety of insects afford us examples of poisoned wounds. But a more serious and dangerous instance, which we meet with in this climate, is seen in the cuts accidentally received in the dissection of putrid bodies, or in handling instruments infected with any irritating or venomous matter, as sometimes happens to the surgeon in the performance of operations on gangrenous limbs, and in dressing venereal and other infectious ulcers. The most dangerous, however, of all the poisoned wounds which ever occur in this kingdom, are those caused by the bite of the viper, and by that of several rabid animals, especially the dog and cat.

Wounds are farther divided by surgical writers into those of particular regions, or parts of the body: thus, we have *wounds of the head*, *face*, *throat*, *chest*, *abdomen*, *limbs*, *arteries*, *veins*, *nerves*, *lungs*, *liver*, *&c. &c.*

Wounds may likewise be universally referred to two other general classes, viz. *simple* and *complicated*. A wound is called *simple* when it occurs in a healthy subject; has been produced by a clean, sharp-edged instrument; is unattended with any serious symptoms; and the only indication is to re-unite the fresh-cut surfaces. A wound, on the contrary, is said to be *complicated* whenever the state of the whole system, or of the wounded part, or wound itself, is such as to make it necessary for the surgeon to deviate from the plan of treatment requisite for a common simple wound. The differences of complicated wounds, therefore, must be very numerous, as they depend upon many incidental circumstances, the principal of which, however, are hemorrhage; nervous symptoms; excessive pain; tetanus; a great degree of contusion; the discharge or extravasation of certain fluids, indicating the injury of particular bowels or vessels; the presence of foreign bodies, or of a poison, or irritating matter in the part; loss of substance; the attack of hospital gangrene, &c.

All large or deep wounds are followed by more or less symptomatic fever. According to Professor Thomson, it usually comes on at a period varying from sixteen to thirty-six hours after the infliction of the injury; but, as far as my observation extends, the attack is frequently much earlier than the time here specified. Its occurrence is indicated by a greater warmth of the skin; by an increase in the frequency, and generally also in the strength of the action of the heart and arteries; by anxiety, thirst, and a suppression of the powers of digestion. The symptomatic fever from wounds is generally of the inflammatory character; and it even sometimes happens that a very high degree of it takes place in debilitated constitutions, and in persons who have lost a considerable quantity of blood. In these latter cases, however, the frequency of the pulse is said to be more remarkable than its strength, and the fever rather to put on the asthenic, than the truly inflammatory type. It is of great consequence to attend to the character of this fever; for the loss of blood, which may be required and sustained with impunity in one species of fever, may prove highly injurious, if not fatal, in the other. *

The danger of wounds is proportioned to several circumstances highly deserving attention.'

1. Their size. 2. The degree of violence done to the fibres in addition to their mere division. 3. The little power which the part has of repairing its injuries. 4. Its great importance to the constitution. 5. The size of the injured blood vessels and nerves. 6. The age and constitution of the patient.

1. The removal of a large adipose tumour is often accomplished without injuring any one part of importance, and yet the magnitude of the wound may occasion death.

2. A man cannot bear a large incised, and lacerated wound equally well; because in the latter case, the fibres are not only divided, but stretched, and otherwise injured. I have seen the integuments, covering the anterior surface of the tibia, torn in a straight direction, from the upper head of that bone, nearly to the foot: a rapid mortification of the limb took place, and the man died. Had this been a simple incision, such fatal consequences would probably not have happened, since the wound of amputation, even when a bulky thigh is removed, is not frequently the cause of

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* See Thomson's Lect. on Inflammation, p. 292.

death. All contused and gun-shot wounds are, for this reason, more perilous, than if they were simple breaches of continuity.

3. Joints seem to possess but little power of repairing their accidental injuries, which often induce a state of irremediable disease in the part, or so violent a disturbance of the whole system, that the patient loses his life. I here more especially allude to wounds of the large joints; for the smaller articulations generally bear extensive injuries as well as most other parts. Some other parts are also prevented from readily healing, owing to the continual or frequent passage of fluids through them. This is the case with all the ducts and outlets of secreting organs, the intestinal canal, the arteries, &c.

4. The slightest wound of a part, the functions of which are intimately connected with life, is often fatal. The brain, stomach, &c.

5. When large arteries are injured, the hemorrhage if not immediately stopped, will destroy life in a few seconds; and, when the main artery and nerve of a part are both divided, there is generally a considerable risk of mortification, in addition to the first danger from the bleeding, as I have explained in a previous chapter.

6. Wounds in young, strong, healthy subjects generally heal more quickly and favourably, than in persons of advanced age, and impaired constitutions.

INCISED WOUNDS.

An effusion of blood from the divided vessels, pain arising from the division of nerves, and a gaping of the wound, or separation of its edges from each other, are the immediate effects of a wound inflicted in the skin or flesh with a sharp cutting instrument.

Anatomy teaches us that almost every part of the body is furnished with a vast number of blood vessels, which, indeed, exist in such myriads that it is impossible to prick the skin with the point of the finest needle, without opening one or more ramifications of vessels containing blood, which fluid instantly oozes out of the minute puncture. But this effect always happens in a greater and more remarkable degree when there is an extensive cut in the skin or flesh; and if any of the wounded vessels be above a certain magnitude, the hemorrhage may be profuse, and even immediately fatal.

The same experiment which demonstrates the presence of blood vessels in every situation, namely, pricking any part of the body with a needle, proves also, that filaments of the nerves exist every where, and at every point; for the slightest prick of the skin occasions pain; and pain cannot happen except where there are nerves. The pain of wounds is observed to be more or less acute, according to the kind of cutting instrument with which they have been inflicted; the extent of the division; and, especially, according as the individual happens or not to be in expectation of the receipt of the injury. A patient, on whom an operation is to be performed, turns his whole attention to the effect which the use of the knife will produce upon his feelings, and he suffers a great deal; but if an incision be made when not expected, or when the mind is intent on other things, the agony is more moderate. Thus, a soldier may be wounded in the heat of battle, and not feel the hurt till the bleeding attracts his notice.

When the skin, or flesh, is divided with a cutting instrument, the edges of the wound separate from each other, and the injury presents a gaping appearance. The instrument itself, acting like a wedge, must unavoidably separate the parts between which it enters; but, if this were the only cause, the gaping of a wound would be very inconsiderable, since the blades of most cutting weapons are extremely thin. We find, however, that the opposite surfaces of many wounds are drawn away from each other several inches, and the principal causes to which the phenomenon is to be ascribed, are the natural elasticity of some parts like the skin, cellular membrane, fasciæ, &c.; and this property, together with an active power of contraction, inherent in the muscles.

The quality of elasticity which belongs to all animal substances, and is inherent in them even after they have been deprived of life, does not prevail in an equal degree in every texture. Hence, the degree of separation produced between the edges of a wound by this cause varies considerably, according to the nature of the divided parts. The edges of an incision in the skin become widely drawn asunder, because the integuments are endued with great elasticity. The cellular membrane, when cut, gapes very little, because it is less elastic. The extremities of a divided artery recede far from each other; the retraction being far greater than what happens in divided veins, which possess a much smaller share of elasticity. The muscles, also, are not remarkably elastic; yet wounds of them, especially transverse wounds, always have their opposite sides considerably separated from each other; but this is a circumstance which is owing not altogether to the elasticity of the parts, but chiefly to a vital power of contraction inherent in muscular fibres.

The separation of the edges of a wound in elastic parts is also not always in proportion to the elasticity of those parts, but depends in some measure upon the degree of tension in which they happen to be at the moment of the injury. An exceedingly simple experiment proves the truth of this observation: if the skin which covers the knee be divided transversely in a dead subject, while the leg is bent upon the thigh, and another similar incision be made in the knee, while the leg is extended, the separation which happens between the lips of these wounds, will be found to be much greater in the first than the second example.

The prognosis of wounds, made with a cutting instrument, varies according to the extent and depth of the division, the nature of the injured parts, and several circumstances which rank as complications. Deep large wounds are more dangerous and difficult to cure than those which only interest the skin. Wounds, accompanied with injury of large blood vessels, or nerves, are more or less dangerous, according to the magnitude and importance of those vessels and nerves, and the possibility, or impossibility of obtaining speedy surgical assistance. Simple cut wounds, in which the only indication is to bring the divided parts together, are the most favourable cases of all. On the other hand, complicated incised wounds are more or less serious and hazardous, according to the particular nature of the complication, whether this be a wounded artery, vein, or nerve of magnitude and importance; a wounded excretory duct; a wounded bowel; a wounded trachea; œsophagus, &c. The complications also of bad health, and very advanced age, are other considerations which should influence the prognosis. Generally speaking, the most dangerous examples of incised wounds are those which are made about the throat, by persons who attempt to destroy themselves. Here there are so many large blood vessels, nerves, and other organs of importance, that deep incised wounds too often prove fatal, either immediately or in a short time. Sometimes the patient opens the carotid artery, and perishes of hemorrhage on the spot, before any assistance can be rendered. In other instances, he divides some of the principal branches of the external carotid, and after losing a great deal of blood, faints, in which state the hemorrhage may cease for a little while. The fainting, indeed, is often the very thing which saves his life, by checking the effusion of blood until the surgeon arrives, who ties the vessels as soon as they begin to bleed again. Cuts, wounds of the extremities, when such arteries as the femoral and brachial are injured, may also suddenly destroy the patient by the great quantity of blood which is sometimes lost before the arrival of surgical assistance.

I shall next consider the chirurgical measures requisite in the treatment of incised wounds.

In these cases, there is frequently nothing to be remedied, except the simple breach of continuity, the cut fibres not having been stretched, contused, nor lacerated. When no artery of importance is divided, and no extraneous bodies are lodged in the wound, the duty of the surgeon consists in promoting the reunion of the divided surfaces without delay.

It often happens, however, that considerable vessels are injured, and then the bleeding demands primary attention.

CHAP. XIII.

MEANS OF STOPPING HEMORRHAGE.

IT has been stated, that, in every wound, the bleeding is the thing which demands the earliest attention, because, if loss of blood be not prevented without delay, the patient will frequently die in the course of a few seconds or minutes. Every other consideration may be deferred, but, when large vessels are injured, they must be immediately secured, or else the sudden death of the patient will leave the surgeon no opportunity of exhibiting his skill and usefulness in other matters connected with the treatment.

Previously to considering what surgical means are best calculated for stopping hemorrhage, it seems right that I should endeavour to give the reader some notion of the nature of the process, by which the bleeding from wounded arteries is permanently suppressed. Arteries, as Dr. Jones observes, are supplied not only with small arteries and veins (the vasa vasorum), but also with absorbents and nerves, and have, in these respects, a similar organization to the other soft parts of the body. This structure makes them susceptible of every change to which living parts are subjected in common, enables them to inflame when injured, and to pour out coagulating lymph, by which the injury is repaired, or the tube is permanently closed. * In short, the coats of arteries inflame, and pass through all the stages of adhesion, sup-

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* Treatise on the Process employed by Nature in suppressing the Hemorrhage from Divided and Punctured Arteries; and on the Use of the Ligature; concluding with Observations on Secondary Hemorrhage, p. 5. 8vo. Lond. 1805.

puration, or gangrene, in the same manner as the skin, a gland, or a muscle.*

Surgeons formerly entertained various theories concerning the process, by which the hemorrhage from divided arteries was suppressed; but as none of these seemed altogether satisfactory, the late Dr. Jones was led to undertake a series of interesting experiments, the results of which enabled him to give a more correct view of the subject; and, from these investigations, it appears, that when an artery of moderate size is *divided*, the bleeding is stopped in the following manner: An impetuous flow of blood, a sudden and forcible retraction of the artery within its sheath, and a slight contraction of its extremity, are the immediate, and almost simultaneous effects of its division. The natural impulse, however, with which the blood is driven on, in some measure counteracts the retraction, and resists the contraction of the artery. The blood is effused into the cellular substance, between the artery and its sheath, and passing through that canal of the sheath, which had been formed by the retraction of the artery, flows freely outward, or is extravasated into the surrounding cellular membrane, in proportion to the open, or confined state of the external wound. The retracting artery leaves the internal surface of the sheath uneven, by lacerating, or stretching the cellular fibres which connected them. These fibres entangle the blood as it flows, and thus the foundation is laid for the formation of a coagulum at the mouth of the artery, and which is completed by the blood gradually adhering, and coagulating around its internal surface, till it completely fills it up from the circumference to the centre.

The hemorrhage is checked by the effusion of blood into the surrounding cellular substance, and between the artery and its sheath; but, particularly, by the diminished velocity of the circulation, occasioned by the bleeding, and by the quick manner in which the blood always coagulates, when the action of the vascular system is much diminished.

Thus a clot over the mouth of the artery, within its sheath, called by Dr. Jones the *external coagulum*, presents the first complete barrier to the effusion of blood.

The mouth of the artery being no longer pervious, nor a collateral branch very near it, the blood, just within it, is at rest, coagulates, and forms, in general, a slender conical coagulum, which neither fills up the canal of the artery, nor adheres to its sides, except by a small portion of the circumference of its base, which lies near the extremity of the vessel. This coagulum is distinct from the former, and is named by Dr. Jones the *internal coagulum*.

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* Hodgson on the Diseases of Arteries and Veins, p. 1. 8vo. Lond. 1815.

In the mean time, the cut extremity of the artery inflames, and the vasa vasorum pour out lymph, which is prevented from escaping by the external coagulum. This lymph fills up the extremity of the artery, is situated between the internal and external coagula of blood, is somewhat intermingled with them, or adherent to them, and is firmly united all round to the internal coat of the artery.

Dr. Jones further informs us, that the permanent suppression of the hemorrhage chiefly depends on this coagulum of lymph; but, while it is forming within, the extremity of the artery is further secured by a gradual contraction, which it undergoes, and by an effusion of lymph between its tunics, and into the cellular membrane surrounding it. Thus, these parts become thickened, and so completely incorporated with each other, that one cannot be distinguished from the other; the canal and mouth of the artery becoming obliterated, and blended with the surrounding parts.

When the wound in the skin is not healed by the first intention, an exudation of coagulating lymph gives a covering to the end of the vessel, and separates it from the cavity of the wound.

In the inferior portion of the divided artery, the orifice of the vessel is generally more contracted, and the external coagulum is much smaller.

The extremity of the artery, as far as the first collateral branch, afterwards gradually contracts, till at length its cavity is completely obliterated, and its tunics assume a ligamentous appearance.

The external coagulum, which stopped the hemorrhage in the first instance, is absorbed in a few days, and the thickening of the parts, from the extravasation of lymph, gradually diminishes.

If the end of the artery be examined, at a still later period, it will be found to be reduced to a mere filamentous state, as far as its first branch, and the anastomosing branches considerably enlarged.

Another fact, made out by Dr. Jones is, that, when the division of an artery has happened near a lateral branch, no internal coagulum is formed.

When an artery is *punctured*, or only *partially divided*, the blood is effused into the cellular substance, between the artery and its sheath, for some distance, both below and above the wounded part. On examination, a short time after the hemorrhage has stopped, a stratum of coagulated blood is found between the artery and its sheath, extending from a few inches below the wounded part, to two or three inches above it, and is somewhat thicker, or more prominent, just over the wounded part, than elsewhere.

In consequence of the space between the artery and sheath, becoming filled with blood, and the latter part distended, the relative situations of the punctures in it and the artery are altered, and thus a coagulum of blood becomes confined by the sheath over the puncture in the vessel, and stops the hemorrhage.

But this is only a temporary barrier; and the permanent stoppage of the bleeding is effected by reparation, or obliteration.

Dr. Jones's experiments tend also to prove, that if an artery be wounded only to a moderate extent, it is capable of re-uniting, and of healing so completely, that, after a certain time, the cicatrization cannot be discovered, either on its internal, or external surface; and that even oblique and transverse wounds, (which are attended with more gaping than longitudinal ones,) when they do not open the artery to a greater extent than one-fourth of its circumference, are also healed, so as to occasion little or no obstruction in the canal of the artery. But, as Petit observed, this can hardly ever happen, except when the aperture in the vessel has been of very moderate size. * In larger wounds, the vessel is rendered impervious by the effusion of lymph; and, when the division is still more extensive, the partially divided part of the vessel becomes either torn, or ulcerated through. †

1. TOURNIQUET.

Although Ambrose Paré was acquainted with the utility of compressing the great arteries in the performance of capital operations, it does not appear, that he ever thought of contriving any instrument for this express purpose; but left the honour of so simple, but important an invention, to one of his countrymen, named Morel, by whom the tourni-

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* Mém. de l'Acad. Royale des Sciences, an. 1735.

† Jones, op. cit. chap. i. sect. 3. and chap. ii.

quet was devised about the year 1674. But Morel's tourniquet was far from perfection; for it compressed equally every part of the circumference of a limb, not acting more on the situation of the main artery than on any other point. It therefore remained for another French surgeon, M. Petit, to improve the instrument, and plan its construction on the principles adopted in modern practice. The tourniquet now in use consists of a band and buckle, a pad, and a sort of brass bridge, capable of being elevated and depressed, by means of a screw. The band is first buckled round the limb in such a manner, that the pad, which is attached to the band, is placed exactly over the artery. The bridge, over which the band proceeds, is then to be raised by turning the screw, and thus a due degree of pressure is produced.

The advantages of this instrument are so considerable, that its first invention constitutes a great epoch in the annals of surgery. The pressure may be regulated with the utmost exactness, and it operates chiefly on the point where the pad is placed, and where the main artery lies. The instrument does not require the aid of an assistant to keep it tense; it completely commands the flow of blood into a limb; it may be relaxed, or tightened in a moment; and when there is reason to fear a sudden renewal of bleeding, it may be left slackly round a limb, and, in case of need, made tense in an instant.

Its operation, however, is limited to the limbs, and as the pressure, necessary to impede the flow of blood through the principal artery, completely prevents the return of blood through the veins, it application cannot be made very long, without inducing gangrene. Nor does it have any direct effect in promoting the closure of the wound in the artery. Hence, its utility is confined to preventing and putting a sudden stop to profuse hemorrhages, until the surgeon has had time to put more permanent means into practice.

The tourniquet is occasionally applied in a moderate state of tension, with a view of weakening, not suppressing, the current of blood into a limb. The common one does not accomplish this object advantageously, because, in retarding the return of blood through the veins, it has the effect of rendering the arteries more charged with blood, consequently any that are wounded more likely to bleed. In cases of aneurisms, where this plan is sometimes practised, the compression of the veins does infinite harm, by augmenting the œdema, and painful tension, so frequently attendant on that disease.

2. LIGATURE.

We have observed, that the tourniquet is generally employed, only as a temporary means of suppressing hemorrhage. Let us now take a view of other means which have a permanent effect in the stoppage of bleeding, by producing a closure of the wounded vessels. The most important of these is the ligature, by which the most alarming effusions of blood may be restrained. With this, the mouths of the divided arteries are tied, and thus, not only an instantaneous stop is put to further hemorrhage, but, long before the ligature becomes loose, the opposite sides of the vessels have generally grown together, and all danger of the renewal of the bleeding is over.

Several of the conclusions drawn from Dr. Jones's experiments upon the subject of hemorrhage are of the highest importance, in relation to the practice of surgery, and, were they all of them universally admitted, little doubt would remain about the most advantageous manner of making and applying ligatures. That a ligature, especially a small one, when applied round an artery with a proper degree of tightness, cuts completely through the inner coats of the vessel, is a fact which is now acknowledged by all the best-informed writers on surgery, whatever may be their sentiments about other contested points in regard to the best mode of tying arteries. But whether we should employ such ligatures, as are expressly calculated to produce this effect, and whether we should aim at it, as a beneficial and useful, not to say an essential, object, are questions on which the greatest authorities are yet divided. From a variety of experiments, Dr. Jones was led to infer, that the division of the membranous and muscular coats of a tied artery by the ligature had a principal share in bringing on the effusion of coagulating lymph within the vessel, or, in other words, the process of adhesive inflammation, by which the permanent closure of the vessel was effected. He observes, that when a ligature is properly applied, it cuts through the internal and middle coats of the artery, keeps their cut surfaces in contact, and affords them an opportunity of uniting and cicatrizing, as other cut surfaces do, by the adhesive inflammation. Nay, he extended the doctrine further, by representing the division of internal coats of the vessel by the ligature, not merely as advantageous, but as absolutely indispensable; for he remarks, that if the ligature does not completely cut through the internal and middle coats, all round the artery, adhesion cannot take place between its internal surfaces, and therefore secondary hemorrhage will take place as soon as the ligature has ulcerated through any part of the parietes of the artery.[*]

That Dr. Jones erred in describing the division of the inner coats of the vessel as a thing, without which the vessel could not be closed by the process of adhesive inflammation, remains no longer questionable. The assertion, as Mr. Crampton[†] has observed, rested upon no other foundation, than several experiments, made on the arteries of quadrupeds, in *all of which* the internal and middle coats were ruptured by the application of the ligature. No comparative experiments are related in order to shew, that this operation of the ligature is so essential to the process of union, that, under these circumstances only, the obliteration of the artery can take place. Numerous instances are on record of arteries being obliterated by the pressure of tumours. The subclavian and carotid have been found obliterated by the pressure of an aneurism of the arch of the aorta.[‡] In Mr. Freer's experiments (continues Mr. Crampton) the pressure of a tourniquet for four days was sufficient to effect the obliteration of the radial artery in horses.[§] Mr. Hunter observed, that in dogs, the mere exposure of the tibial artery to the air for about an hour excited such a degree of inflammation and thickening of its coats, as completely to obstruct the canal.[||] All the great arteries, the aorta inclusive, have been found obliterated, in consequence of the effusion of lymph from their internal coat, and this independently of any injury which could produce the rupture of that membrane. The cure of aneurism by compression (whether mediate or immediate) affords an example of the obliteration of an artery without any rupture of its internal coats.[¶]

In the course of the interesting experiments undertaken by the late Dr. Jones, he found, that when a ligature is tightly applied round a large unwounded artery in a quadruped, so as to cut through the internal coats, and it is immediately afterwards removed, the adhesive inflammation takes place at the part of the vessel which was embraced by the ligature, and the canal of the artery becomes permanently obliterated for some extent. This consequence happened, however, with increased certainty, when two or more ligatures were thus applied near each other, and then taken off. *

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[*] On Hemorrhage, p. 166. and 170.

[†] Medico-Chir. Trans. vol. vii. p. 343.

[‡] Hodgson on the Diseases of Arteries and Veins, p. 110. A. Cooper in Med. Chir. Trans. vol. i. p. 12.

[§] Obs. on Aneurism, p. 14.

[||] On the Blood, &c.

[¶] Crampton in Med. Chir. Trans. vol. vii. p. 345.

The promulgation of these observations at first excited hopes, that the leaving of a ligature, on arteries, tied for the cure of aneurisms, might be dispensed with; and what Dr. Jones had himself succeeded in accomplishing, did not fail to convince him still more firmly, that the division of the inner coats of the artery was the main exciting cause of the adhesive inflammation, by which the canal of the vessel was permanently closed; and that the obliteration could not happen unless those coats were cut through by the ligature. But, as Mr. Travers has observed, the result of these experiments neither warranted the conclusion, that the complete incision of the internal coat was necessary to union, nor that union was a necessary consequence of such an incision. The history of the broad tape, or ribband ligature, proves, that contact without wound will sometimes produce adhesion, and the frequent repetition of Jones's experiment has proved, that wound without contact will often fail to produce it. Mr. Dalrymple of Norwich has repeated the second experiment of Dr. Jones's third chapter, not less than seven times on horses, and three times on sheep, and in every instance failed in obtaining the same results as Dr. Jones. Not only was no coagulum formed, but, even when the animal had been suffered to live until the thirteenth, fifteenth, or eighteenth day after the operation, the canal of the artery was not found obliterated. Its calibre was indeed contracted; but the tube remained in some degree pervious, and capable of transmitting a lessened column of blood. † The evidence of another eminent writer also coincides precisely with that of Mr. Dalrymple. ‡

Dr. Jones's idea, that the division of the internal coats was essential to the production of the requisite degree of adhesive inflammation for the obliteration of the cavity of the artery is completely refuted, not only by the facts adverted to by the preceding authors, but by a variety of other considerations. A ligature was put round the carotid of a dog without being drawn. It lay in contact with the artery, but did not press upon it, nor interrupt the flow of blood through it. The result was an obliteration of that part of the vessel which was irritated by the presence of the ligature. The same experi-

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* Jones on Hemorrhage, p. 126, &c.

† Travers in Med. Chir. Trans. vol. iv. p. 442.

‡ Hodgson on Diseases of Arteries, &c. p. 228.

ment was made on the carotid of an ass with a similar consequence.* Here then we have further proofs, as unequivocal as any of those previously cited from Mr. Crampton's valuable paper, that the internal coat of an artery will effuse coagulating lymph when any cause of sufficient irritation exists on the outside of the vessel, and that the division of its inner coats by a ligature is by no means essential to the excitement of the adhesive inflammation within it.†

As Scarpa remarks, all parts which resemble each other, and especially serous membranes, including the inner coat of the arteries, when kept in close contact in sufficiently vigorous subjects, generally assume with surprising quickness the adhesive inflammation in the seat of the compression, and around it, evincing a singular propensity to effuse coagulating lymph, and, though such membranes are inflamed, they remain free from all ulceration, or breach of continuity. This is daily seen happen between the lungs and pleura, between the peritoneum and the viscera of the abdomen, and between the tunica vaginalis and the testicle. And, in order to assure ourselves that the same phenomenon also happens betwixt the two opposite sides of an artery, which are simply held in close contact with each other, without any previous ulceration, or rupture of them, we need not have recourse to analogy in what takes place under the same circumstances in other similar parts of the body, since there are numerous instances of the quick union and perfect closure of an artery, by means of the adhesive inflammation, under simple compression alone, practised upon the artery while all its parts remain entire. Dubois‡ effected this prompt adhesion by means of the serre-noeud of Desault; Assalini §, by compressing the artery with his forceps; and Crampton with a presse-artère, resembling that of Deschamps. To these facts, we are to add numerous others of the closure of the artery, in consequence of pressure made on the vessel by a neighbouring tumour, or even an aneurismal sac itself. If the ligature were absolutely preferred to compression, in the treatment of external aneurism, it would yet be certain, that by means of pressure, applied above the seat of the disease, several speedy and fortunate cures have been accomplished; and if the compressing apparatus does not always produce such good effects, it is often because we have not the opportunity of making the pressure with sufficient steadiness and force to obliterate the artery. Compression (says Scarpa) generally answers very well when made upon an exposed artery, behind which there is a point of resistance. Samuel Formy*, in a case where the brachial artery was wounded, laid bare the vessel, placed a cylinder of linen upon it, and over this some graduated compresses, supported by means of a suitable bandage; and thus he effected the closure of the artery.† Guattani, exposed the femoral artery as it passes under Paupart's ligament, compressed it against the ramus of the os pubis with graduated little bosters and a bandage, and the vessel was speedily closed. Flajani ‡ in similar cases has found the same method answer. Buzani, a surgeon of Turin §, also succeeded with graduated compresses in healing a wound of the brachial artery, after bleeding; and so did Garneri in two additional examples of the same nature. Scarpa corroborates the purport of these observations by a relation of some experiments in which the arteries of sheep and other quadrupeds were tied with a simple ligature, and also with a ligature between which and the vessels a roll of waxed linen was placed, in order to prevent the inner coats from being cut through. The main result was, that in all these cases the artery closed, but the ulceration advanced more quickly in the instances where the simple ligature was ‖used. Four cases are likewise recorded, in which Scarpa's mode of applying the ligature was successfully practised in operations for aneurism. Some other experiments performed by Signor Mislei, and introduced at the conclusion of Scarpa's memoir, I shall notice in the chapter on aneurism, to the treatment of which disease they more particularly refer.

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* C. Bell, Surgical Obs. vol. i. p. 261.

† See also Crampton's Experiments with a flat ligature, and piece of metal, on the carotids of sheep, in Med. Chir. Trans. vol. vii. p. 346., and other experiments detailed by Scarpa in his Memoria sulla Legatura delle principali Arterie degli Arti, &c. Fol. Pavia, 1817. p. 54. et seq.

‡ Leveillé, Nouvelle Doctrine Chir. t. iv. p. 247—260.

§ Manuale di Chirurgia.

The foregoing considerations cannot allow us to hesitate a moment about the rejection of Dr. Jones's assertion, that a ligature will never be followed by an efficient degree of adhesive inflammation within a tied artery, unless the inner coats of the vessel be divided by the cord. Instead of this sweeping inference, Dr. Jones should merely have concluded, that such inflammation may take place, after the ligature has had the effect described, and not that it cannot happen under any other circumstances. The determination of this question, however, is not at all a decision of the other point, viz. whether such division of the inner coats of an artery by the ligature be useful, or detrimental, in its effects upon the process, by which the vessel is to be obliterated. This is an investigation of greater difficulty, and one, concerning which very opposite sentiments prevail.

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* Traité Chir. des Bandes Larges Emplâtres, &c. Montpelier, 1652.

† De Aneurysmate, Historia 15.

‡ Collezione d'Osservazioni e Riflessioni di Chirurgia, t. ii. p. 47, &c.

§ Opere di Bertrandi. Trattato dell Operaz. t. iii. p. 207. Gli editori.

‖ Memoria sulla Legatura, &c. p. 27. 34, &c.

The fact of the internal and middle coats of an artery being divided by a common ligature, tightly applied to the vessel, the outer tunic alone remaining unbroken, was known to Desault, and was afterwards mentioned to Dr. Jones by Professor Thomson, of Edinburgh. Dr. Jones, as I have already explained, considered such division as the best means of promoting the effusion of coagulating lymph within the vessel, and as the surest and most prompt mode of bringing about the union and closure of the tied part of the arterial canal. Hence, he gave a decided preference to small ligatures, which always cut through the inner coats of the vessel with the greatest certainty.

He thinks, that ligatures should be round, and very firm; and he declares, that there is no danger of their making the external coat of the artery ulcerate, by their tightness, before the internal ones have adhered; for, the union of the latter is found to be soon effected.

Dr. Jones reprobates broad, flat ligatures, because they cannot be tied smoothly round the artery, which must become puckered, and, consequently, have an irregular, bruised wound made in its middle and internal coats. By covering a considerable part of the external surface of the artery, they may also destroy the very vessels, which pass on it, in their way to the cut surfaces of the internal and middle coats, and thereby render them incapable of inflaming. But, says Dr. Jones, admitting that such a ligature makes a proper wound, and that the wound unites, still it may cover that part of the external coat, which is directly over the newly united part, and, consequently, as soon as it has occasioned ulceration through the external coat, it will produce the same effect on the newly united parts, and, of course, secondary hemorrhage.

A ligature of an irregular form will not cut through the inner coats of the artery equally at every point, which Dr. Jones endeavours to prove ought to be done, with a view of occasioning an effusion of lymph, and adhesion.

Dr. Jones has also explained the advantages of applying ligatures in as circular a manner as possible; not higher on one side of the vessel than the other. Any deviation from a circle must be unfavourable to a steady apposition of the cut surface of the artery, and be conducive to secondary hemorrhage.

Mr. Crampton, however, is far from admitting the utility of cutting through the internal coats of the artery with the ligature, and is of opinion, that, in man, the division of these coats not unfrequently prevents the obliteration of the artery, and gives rise to secondary hemorrhage; two assertions which appear to me not to be very well proved. If it be meant to draw a weighty argument from the weakening of the artery by this effect of the ligature, and an apprehension of the vessel bursting, or becoming dilated, how can we give such importance to this mode of reasoning, when such inability of the remaining external coat to resist the impetus of the circulation must be very rare? Although the two middle coats are divided by the ligature in securing the vessels in the common way after every operation, I have never seen an artery give way, or become dilated from this sort of cause. I have known the ligature slip from not having been skilfully applied; I have known it accidentally pulled off by a jerk of the hand, and hemorrhage take place. I can even suppose, that an artery may be so forcibly tied as actually to produce a direct laceration of the external coat; but then the cause would rather be owing to the operator himself than to any fault of his ligature. An artery may also be in so diseased a state as to give way at once under the application of the ligature; or if it should not burst so immediately, yet from being incapable of the adhesive inflammation, it may afterwards pour out its blood as soon as the ligature has produced ulceration through the external coat, But, in this circumstance, it is evident, as Scarpa himself allows *, that no mode of tying the vessel will answer. As we are not sufficiently acquainted with the actual state of the vessels, the kind of ligatures employed, and some other essential particulars, in the few cases cited by Mr. Crampton, with a view of proving the risk of arteries giving way from their inner coats being cut through by the cord, we cannot pronounce, whether these were really examples of this injurious operation of the ligature; or whether they might not rather be specimens of some uncommon diseased state of the arteries. For my own part I cannot suppose any instance, in which the brachial artery, after being tied in amputation, would three times form an aneurismal tumour above the ligatures † if it were not in some unusual state of disease, because

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* Memoria sulla Legatura delle Principali Arterie, p. 7.

† See Warner's Cases in Surgery, p. 138. Probably, the inner coats of the artery were in this case not divided, because the vessel was secured with a needle and ligature, and of course an intervening portion of flesh included. Mr. Warner himself entitles the case "An *Extraordinary* Disease of the Humeral Artery."

I have seen hundreds of amputations, but never saw such an occurrence. Besides, if this particular case prove any thing, it proves, at all events, that the largish ligatures used in Mr. Warner's time, which ligatures probably never fairly divided the inner coats of a sound artery, could not prevent the vessel in question from giving way. Without extending these criticisms, however, I may safely assert, that the advocates for the utility of cutting through the inner coats of the vessel, and the employment of small fine ligatures, will come off triumphantly, if they only encounter such objections as are founded upon the danger of the artery at once giving way, or forming an aneurismal tumour. It avails little to talk, as Scarpa has done, of the arteries of some individuals being of preternaturally weak texture from birth *, or to urge with Mr. C. Bell, that, if a dead artery be tied too tightly, it will burst at the tied part when distended with anatomical † injection. The question can never be decided by such statements; and when we admit with these writers, that an artery with three unbroken coats is physically stronger than when two of these coats are broken, or torn, we still maintain, that the remaining external coat is strong enough to resist the impetus of the circulation, as far as we can judge from the general result of the practice, in which it is a particular object with the surgeon to cut through the inner coats of arteries in applying the ligature. It matters not what happens in the injection of dead bodies; what happens in aneurismal and diseased arteries before the ligature is employed; what may have happened in very unusual cases, shewing that ligatures are not infallible; it must yet be proved, that the tying of arteries, on the principles recommended by Dr. Jones, is generally less successful, than other plans.

Amongst the most distinguished surgeons, who oppose the doctrines and practice recommended by Dr. Jones, and so extensively approved of in this country, is Scarpa, whose valuable observations on many parts of anatomy and surgery have rendered him the pride of the modern Italian school. After briefly describing the process of obliteration, according to Dr. Jones's account, and mentioning a few other things, to which I have already adverted, he argues, that as cutting through the internal coats of an artery must render the vessel weaker, than when its coats are left undivided, and we can never estimate the density of such a vessel in the living subject, it

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* Memoria sulla Legatura delle Principali Arterie degli Arti, p. 25.
† Surgical Obs. vol. i. p. 260.

is cæteris paribus undoubtedly better to tie the vessel in such a way, as will leave all its three coats uninjured. It is well known, he proceeds to remark, that, when the internal coat is ulcerated from internal causes, and the adhesive inflammation does not supervene quickly enough, the blood is invariably effused through the layers of the middle tunic, and extravasated on the outside of it; first in the form of ecchymosis, and afterwards in that of an aneurismal swelling. Now, if this can happen, when only the inner coat is ulcerated, it must still more easily take place, when with the internal the middle coat is also divided, and any cause retards the adhesive inflammation. It is true, says Scarpa, that, even in this second case, if, directly after the division of the two internal coats, the artery is affected with the requisite degree of adhesive inflammation, as fortunately must mostly happen, (for otherwise so many instances of the success of the circular ligature could not be adduced,) the union and closure of the vessel follow as speedily and favourably as if the two inner coats had not been divided. But Scarpa declares, that this fortunate issue is not constant, especially in man, in whom the adhesive inflammation is not, as it is in brutes, sufficiently quick to produce on the coats of the artery its beneficial effects, immediately after the application of a tight ligature. Yet, while the adhesive inflammation is thus retarded, the ulcerative process occasioned by the pressure of the small ligature attacks more rapidly, than surgeons commonly believe, the external cellular coat of the artery, eats more and more deeply into it, and penetrates into the cavity of the vessel, before this has been rendered impervious, and certainly with greater celerity, than if it had to make its way through all the three tunics of which the artery is composed. The slow access of the adhesive inflammation, whether from the general debility of the patient, or from the particular state of the artery itself, is not followed by a proportionate retardation of ulceration, which incessantly proceeds till it gives rise to the worst effects. Besides, though in feeble subjects the attack of adhesive inflammation were not materially impeded, it sometimes happens, that the coagulating lymph effused in the cavity of the artery, as well as the coagulum itself, does not acquire with equal celerity the degree of consistence necessary for firmly connecting together the opposite sides of the artery, which are held in accurate contact. These dangers, says Scarpa, are unquestionably avoided by keeping all the three coats of the tied artery from being injured by the pressure of the ligature. It does not appear to Scarpa to be at all proved, that, under an equality of circumstances, favourable to the success of the Hunterian operation for aneurism, the rupture of the internal and middle coats of the artery contributes more effectually to excite the adhesive inflammation, and the union of the artery, than simple compression, and keeping the two opposite sound uninjured sides of the vessel in close contact with each other. And if, in matters of such importance, it be permitted to entertain conjectures, says Scarpa, one would rather say, that a rupture of the internal coats, thus produced, would be more likely to produce ulcerative than adhesive inflammation, in the cavity of the artery; since the solution of continuity, caused by a small ligature, rather resembles a lacerated contused wound, than an incision. He argues also, that the ligature, after cutting through the inner coats, never afterwards holds the margins of the solution of continuity in reciprocal contact, but sinks and intervenes between them, and, strictly speaking, only constricts the two opposite unbroken sides of the external coat.[*]

But, after all this reasoning, we must return to experience; and, if Mr. Crampton and Professor Scarpa have produced cases exemplifying the possibility of effecting the obliteration of arteries, without a division of the inner coats of the vessels, as I admit has been fully proved, they cannot subvert the fact, acknowledged by all the most experienced surgeons in this metropolis, that, since Dr. Jones's principles have been acted upon in practice, and small ligatures have been employed for securing bleeding and aneurismal arteries, cases of secondary hemorrhage have become much more uncommon. Indeed I cannot say that I have heard of a single disaster of this kind, in any case of aneurism, in which a fine ligature was used, and due care taken not to disturb and irritate the artery, nor separate it too much from its surrounding connections. If this be the truth generally, it is an answer to every argument used by the opponents of Dr. Jones's principles. With respect to the danger of the external coat being ulcerated through more quickly by a ligature, which divides the other two coats, as this occurrence will enable the surgeon to remove the extraneous substance sooner, it must be a great advantage, if it be also a fact, as experience tends to prove, that such division of the inner coats expedites the adhesive inflammation, and insures the closure of the vessel, before the ulceration has penetrated through the external tunic.

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[*] Memoria sulla Legatura delle Principali Arterie, p. 26—28.

Dr. Jones refutes the idea of the impulse of the circulation making the ligature slip off; a fear which has led to very hurtful practices, with a view of mechanically fixing the ligature; and he observes, that a candid inquirer into the cause of it will find a much more rational explanation, either from the clumsiness of the ligature, which prevented its lying compactly and securely round the artery; or from its not having been applied tight enough, lest it should cut through the coats of the artery too soon; or from its having that very insecure hold of the artery, which the deviation from the circular application must necessarily occasion.

No other plan of preventing bleeding from large arteries is so secure as the ligature, because no other makes such direct pressure on them, nor acts with such little chance of being displaced. It is in the ligature, that modern surgery has a very material superiority over its ancient state. In the performance of operations, large vessels are often wounded in situations, where the tourniquet cannot be applied. The scientific surgeon now knows, that he can tie such a vessel immediately it is wounded, and then continue his incisions, without that confusion and danger, which would result from a profuse hemorrhage continuing during the whole of his proceedings.

Good surgeons always endeavour to tie arteries as separately as possible, that is to say, without any nerve, vein, or portion of flesh, being included in the noose of the ligature. Including any of the flesh when it can be avoided, is very wrong, as it causes immense pain, and a larger part of the wound to remain disunited. Ligatures thus awkwardly applied, are also apt to become loose, as soon as the substance between them and the arteries sloughs; or they may form a circular furrow in the flesh surrounding the vessels, and remain a tedious time, incapable of being removed. The intervention of any substance, between the ligature and the artery, must also have a greater tendency to prevent the internal coats of the vessel from being cut through; that very event, on which the safety from secondary hemorrhage is found so much to depend.

Blood-vessels partake of the same organization as other parts. Hence the healing of a wounded artery can only take place favourably, when that part of the vessel, which is immediately contiguous to the ligature, continues to receive a due supply of blood through its vasa vasorum. As these vessels are derived from the surrounding ramifications, it is obvious, that the application of a ligature, to a divided artery, at some distance from where it is encompassed by flesh, must be very disadvantageous

Fig 4.

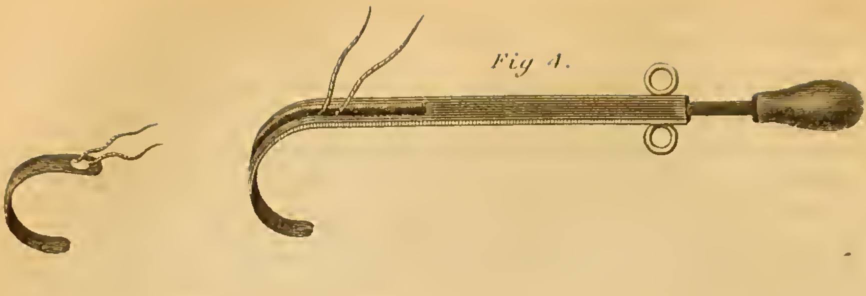
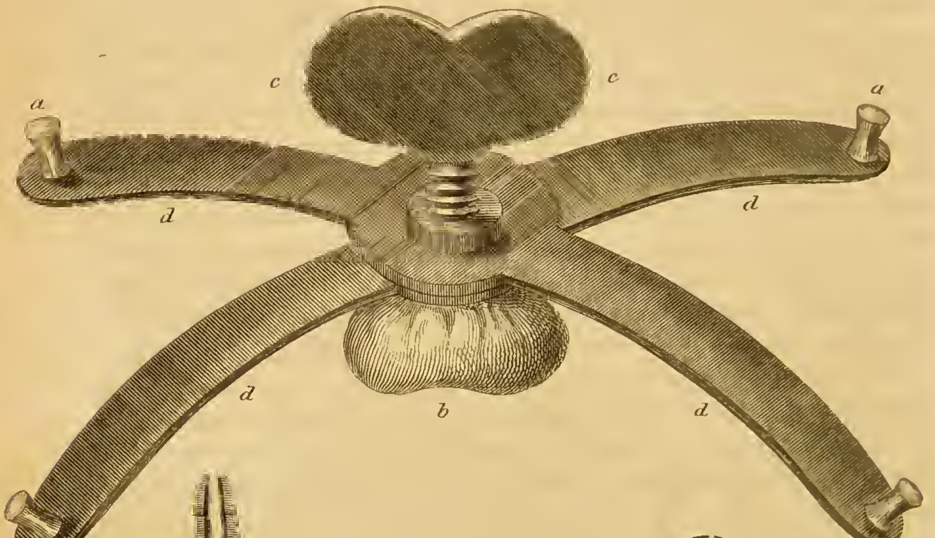


Fig 2.



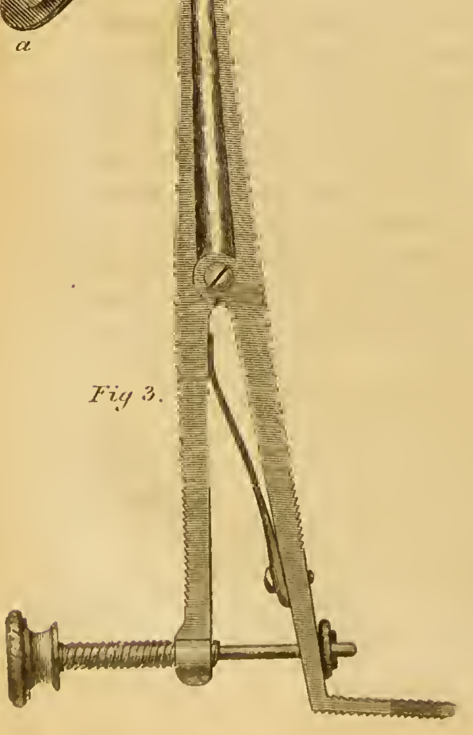


Fig 3.

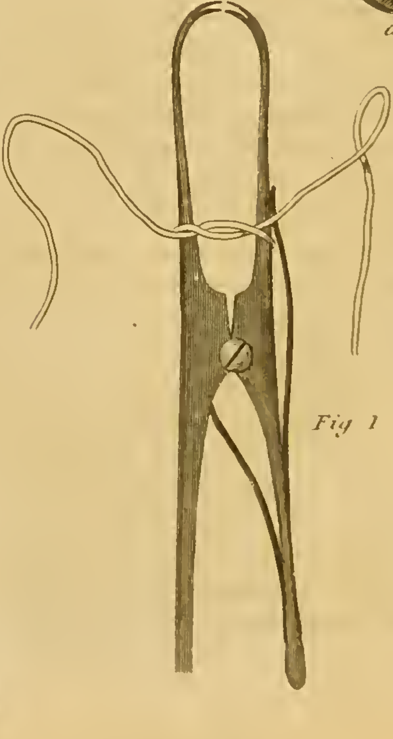


Fig 1

Milton sc.

63 Paternoster Row London

and insecure. Thus, although it is quite improper to include much of the adjacent substance together with the artery in the ligature, it is highly judicious to make the knot as closely as possible to that part of the vessel, which lies undisturbed among its natural connections. These observations only apply to vessels above a certain size; for, such as shrink from the surface of a wound, are not sufficiently visible to be tied in this manner.

The method of tying an artery is as follows: the extremity of the vessel is first to be taken hold of with a tenaculum, or pair of forceps.* The latter instrument is only used when the vessel is large and obvious. Then, a ligature that is round and firm, and by no means too thick, is to be put, in the form of a noose, round the artery, just below the end of the instrument. The noose is then to be drawn tight; and, in order that it may not rise above the mouth of the artery, the end of the ligature must be drawn as horizontally as possible, which can best be done with the thumbs instead of the fingers. A knot is next to be made. Assalini's very ingenious tenaculum would be found exceedingly useful in cases where the surgeon has no assistant at hand. I have introduced an engraving of it in the present edition.†

When the wounded artery is large, one ligature to its upper orifice will not suffice; for, as soon as this is tied, the blood finds it way, through anastomosing branches, into the lower part of the artery, and the lower orifice then begins to bleed.

When a large artery is only punctured, and not completely cut through, the vessel is to be first exposed by an incision, and then have a double ligature put under it by means of an aneurism needle. One portion of the ligature is to be applied above the wound in the artery, the other below it. Thus all danger of bleeding, from the blood getting with great freedom into the lower part of the vessel, is effectually removed.

Sometimes, when the punctured part of the artery cannot be prudently exposed by an incision, the surgeon should cut down to the vessel in a situation nearer the heart, and be content with the application of one ligature.[*]

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* The tenacula exhibited in Mr. C. Bell's Operative Surgery, vol. i. p. 53., appear to me more like the hooks seen in butchers' shops than what ought to be used by surgeons. The size of the ligatures represented there is also extravagant. The artery, at least one-sixth of an inch in diameter, and a piece of flesh as big as the end of a finger, are seen transfixed with a large hook, and surrounded with a ligature that might almost be called a rope. The *tout-ensemble* is well calculated to give the worst idea of English surgery. The plate at p. 55. should also be suppressed, or, at all events, only preserved as a memorandum of what should not be imitated.

† See Plate I. fig. 1.

Since ligatures act as extraneous substances, and only one half of each is necessary for withdrawing it when it is detached, the other is always to be cut off near the knot.

With a view of diminishing still further the quantity of extraneous substance in the wound, the practice of cutting off both ends of the ligature close to the knot has been of late years partially adopted. The period of the first invention of this method appears uncertain. Mr. Hennen, who seems to have been the first who followed the plan in the army, had it suggested to him in 1813, by a Mr. Hume, as the practice of some American naval surgeon; and he has since found, that it has been done in Scotland 16 years earlier than the preceding period. Dr. Fergusson also saw the practice followed in Sweden as early as the peace of Amiens.[†] By some practitioners, the method is intended to be applied to all cases in which ligatures are used, whether the wound admit of being immediately closed or not. Others only think the practice advantageous, when the wound must inevitably suppurate; and they express fears of the inconveniences that may arise from the presence of the little bits of thread, which would be left in the part, if the wound were to be healed over them by the first intention.[‡] The peculiarity in Mr. Lawrence's method, who is an advocate for this kind of practice, even when the wound is to be immediately closed, consists in the use of extremely fine ligatures, made of dentists' silk. From the small atoms of such ligatures, inclosed in the wound, no inconveniences of importance have ever arisen, as far as his experience extends.[§] The bits of silk are not absorbed; but generally appear, either to remain for a time without irritation in the parts, included in minute cysts formed by the adhesive inflammation; or, they afterwards come out by exciting little trivial suppurations on their arrival at the surface of the cutis; or, when the wound does not directly unite, they come away with the discharge.

Although the reports made by Mr. Lawrence, M. Roux[‖], and Mr. Hennen, are extremely favourable to this new plan, it is not yet generally followed, and some of the accounts published respecting it are discouraging.* I think, however, that it is a suggestion, which should not be hastily abandoned, and that, practised with the very fine ligatures recommended by Mr. Lawrence, it will turn out to be a meritorious improvement.

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[*] In a gunshot-wound, injuring the popliteal artery, I once took up the femoral artery, and the plan answered very effectually; but, the safest general rule is undoubtedly to expose the wounded part of an artery, and tie it above and below the aperture, from which the blood issues.

[†] Hennen's Obs. on Military Surgery, p. 189.

[‡] Guthrie, on Gun-shot Wounds of the Extremities, p. 93.

[§] Medico-Chir. Trans. vol. viii. p. 490.

[‖] Parallèle de la Chirurgie Angloise, &c. p. 134, &c.

In a previous part of this chapter, I have adverted to the hopes which were once raised by some of Dr. Jones's experiments, that the momentary application of a tight ligature, so as to divide the inner coats of an artery, would suffice for the future obliteration of the vessel, and that thus, after operating for aneurisms, surgeons might at once close the wound, without any apprehensions about irritation, pain, failure of union, abscesses, ulceration of the artery, and other ill consequences, which may proceed from the presence of ligatures. These hopes, as I have related, were sadly damped by the results of other experiments made by Mr. Dalrymple, Mr. Hodgson, &c. But, though it became certain, that the momentary application of a ligature was subject to frequent failure, a laudable expectation was still entertained, that, at all events, some advantage might be derived from removing the ligature from an artery, as soon as the process by which the vessel was closed had advanced sufficiently far to render the proceeding safe. For pursuing the investigation of this branch of the present important subject, the profession must ever feel itself obliged to Mr. Travers.† The question has also subsequently attracted the notice of Scarpa, who actually concludes in favour of not allowing the ligature to remain on an artery beyond the third or fourth day.‡ As, however, the observations of Mr. Travers, and the practice decided upon by the venerable Italian professor, more particularly relate to the treatment of aneurism, I shall reserve my opinions on the good to be expected from the early removal of ligatures, till we come to the consideration of the latter disease.

Ligatures usually come away, even from the largest arteries ever tied, in about a fortnight, and from smaller ones in the course of five or six days. When they continue attached beyond the usual period, it is proper to draw or rather twist them gently every time the wound is dressed, so as to accelerate their separation.

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* Cross, in Lond. Med. Repository, vol. vii. p. 363.

† Med. Chir. Trans. vol. iv. p. 435, &c. and vol. vi. p. 632, &c.

‡ Memoria sulla Legatura delle Principali Arterie degli Arti, &c. p. 52. Pavia, 1817.

3. COMPRESSION.

This is executed by applying a bandage and compresses in such a manner, that they mechanically stop the effusion of blood. Formerly surgeons used to fill the cavities of wounds with lint, and then make pressure on the bleeding vessels, by applying a tight roller over the part. The moderns understand too well the utility of not allowing any extraneous substance to intervene between the opposite surfaces of a recent wound, to persist in this practice, except in a very few instances. They know, that the sides of the wound may be brought into contact, and that compression may yet be adopted, so as both to restrain particular hemorrhages, and rather promote than retard the union of the wound. When the blood does not issue from any distinct, large vessels, but from numerous small ones, compression is preferable to the ligature. The employment of the latter would render it necessary to tie the whole surface of the wound. In order to make effectual compression in this case, the wound is to have its opposite surfaces brought into contact; compresses are then to be placed over the wound, and a roller is to be applied as tightly as can be done, without hazard of stopping the circulation in the part.

If compression can ever be safely practised in bleedings from large arteries, it is when these vessels run in the vicinity of a bone, against which they can be advantageously compressed. Bleedings from the radial and temporal arteries are of this kind. Compression is sometimes tried, when the brachial artery has been wounded in phlebotomy. Here it is occasionally tried, in preference to the ligature, because the latter cannot be employed without an operation to expose the artery. It is absurd to adopt compression, in this instance, with an idea that it effects a closure of the wound in the vessel without obliterating the arterial canal; and, consequently, with less chance of mortification from a deficiency of blood in the limb. Frequent dissections have evinced, that whenever a large artery has been wounded and healed by pressure, the wound is never closed so as to leave the canal of the artery pervious.

It is true, that Dr. Jones's experiments, as well as those of Beclard *, tend to shew, that an artery, very partially divided, may heal and remain pervious; but this is not to be expected, when the operation of compression is employed.

When an artery of magnitude has received a small wound,

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* Récherches et Expériences sur les Blessures des Artères.

and lies favourably for a trial of pressure, the following plan may be followed.

A tourniquet is to be applied, so as to command the flow of blood into the vessel. The edges of the external wound are next to be brought into contact. Then a compress, shaped like a blunt cone, and which is best formed by a series of compresses gradually increasing in size, is to be placed with its apex exactly on the situation of the wound in the artery. This graduated compress, as it is termed, is then to be bound on the part with a roller. Facts, proving the frequent success of the foregoing expedient, have been already quoted in the present chapter from Flajani, &c.

Some surgeons also apply a longitudinal compress over the track of the vessel above the wound; they do so with a view of weakening the current of blood in the vessel. Whatever good effect it may have in this way, however, is more than counterbalanced by the impediment, which it must create to the circulation in the arm. If the graduated compress be properly arranged, an effusion of blood cannot possibly happen; and the application of pressure, along the course of the artery, must, at best, be deemed superfluous.

After relaxing the tourniquet, if no blood escape from the artery, the surgeon should feel the pulse at the wrist, in order to ascertain that the compression employed is not so powerful, as entirely to prevent the circulation. The arm is to be kept perfectly quiet in a sling; and in forty-eight hours, if no bleeding take place, there will be great reason to expect that the case will do well. *

Compression of large arteries is never commendable, except in such a case as has been just mentioned, or when the wounded vessel is capable of being firmly compressed against an adjoining bone. The compresses sometimes slip off, or the bandages become slack, so as to give room for fatal hemorrhage. When the plan is employed, therefore, the tourniquet should always remain slackly on the limb, ready to be instantaneously

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* Plenk has invented an instrument, which is well calculated for healing wounds of the brachial artery by making pressure, without preventing a sufficient circulation in the arm. See Plate I. fig. 2. Leather straps are attached to the buttons, *a*, *a*, *a*, *a*, and are fastened behind the arm by buckles; one above, the other below, the elbow. The pad *b* is to be placed immediately over a graduated compress, which is to be put directly over the wound in the artery. The necessary degree of pressure may be regulated by the screw *c*; while the branches of the instrument, *d*, *d*, *d*, *d*, are at some distance from the limb, and consequently do not interrupt the flow of blood, either through the arteries or veins.

tightened. In this kind of treatment, the external wound may heal, while the aperture in the artery remains unclosed, and an aneurism be the consequence. This particularly occurs when the pressure is not powerful enough, and when it is too great, mortification of the limb is liable to happen. Such are the objections to compression.

4. AGARIC.

Agaric formerly acquired immense reputation for having the virtue of stopping the most violent hemorrhage, without creating the least irritation. It has, however, no specific property of checking bleeding; and whatever good effects it may seem to have had, are more properly ascribable to the compression adopted in conjunction with its use. If it has any virtue at all, this is a mechanical one, arising from its soft, spongy texture, which qualifies it for filling up all inequalities in the wound, and thus closing the vessels. When we consider, that agaric is intended to be applied to the mouth of the bleeding vessel; and that in this plan, the opposite surfaces of the wound cannot be brought into contact, we shall immediately feel inclined to select some other means, not quite so repugnant to the union of the wound. Compression is often tried, because the vessel cannot be tied without having recourse to an operation in order to expose it. But the employment of agaric is warranted by no such reason; for its supposed specific virtues require its application to be made directly to the divided artery. Agaric has also the inconvenience of acting as an extraneous substance in the wound, and, like compresses, it is liable to slip off the precise situation which it ought to occupy.

When the wounded vessel is large, surgeons should always prefer the ligature to agaric; and when smaller vessels bleed, compression is far preferable to this vainly extolled substance.

These observations on agaric are also applicable to sponge. There are cases, however, in which it is impossible to tie, or compress the bleeding vessel; and improper to employ means which remain to be described. In bleedings from the rectum, and from the wound after lithotomy, the expanding quality of sponge often renders it exceedingly useful. The following means do not operate on the principle of pressure.

5. ACTUAL CAUTERY.

The application of a heated iron to a bleeding vessel is one of the most ancient modes of suppressing hemorrhage; but, at present, it is almost in general disuse. It operates by producing a slough, which covers and closes the mouth of the artery. In order that it may not injure the circumjacent parts, it is applied through a cannula.

There are several formidable objections to its employment. It does not regularly produce a permanent cessation of hemorrhage, as, when the eschar separates prematurely, the bleeding recurs. To many patients, the proposal is attended with horror; to all, the application is severely painful.

The only cases, in which the actual cautery is at all justifiable in modern practice, are hemorrhages situated in the mouth. *

6. POTENTIAL CAUTERY, OR CAUSTICS.

The most common formerly used, was a button of blue vitriol, of the size of a pea, rolled up in a piece of linen, and placed on the aperture of the bleeding vessel. Its operation is similar to that of heated irons. Caustics are even worse than the actual cautery, for their action is more tedious, less effectual, and not confined to the vessel alone. Pelletan has seen inflammation of the dura mater and death produced by applying the muriate of antimony to a bleeding tumour on the head. †

7. STYPTICS.

Styptics are substances alleged to have the property of producing a contraction of the vessels; and, as some suppose, coagulation of the blood. Such are cold air, cold water, wine, brandy, spirits in general, diluted mineral acids, solutions of alum, blue vitriol, &c. These substances do, indeed, possess the power of stopping some hemorrhages from small vessels, but they ought never to be trusted, when large arteries are concerned.

The method of applying fluid applications of this kind is to dip lint in them, and place it on the bleeding surface. Compression is generally adopted at the same time.

That cold air has a styptic property, we have the most unequivocal proofs. We frequently tie on the surface of a wound, every artery which betrays the least disposition to bleed, as long as the wound continues exposed to the air. We bring the opposite sides of this wound into contact, and

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* In Alibert's Nosologie Naturelle, tom. i., is related an amputation of the tongue, where the bleeding from three large arteries was instantly and effectually stopped by touching them with the cautery.

† Clinique Chirurgicale, tom. ii. p. 504.

put the patient to bed. Not an hour elapses before the renewal of hemorrhage necessitates us to remove the dressings. The wound is again exposed to the air, and again the bleeding ceases. I have often seen this happen in the scrotum, after the removal of the testis. The proper conduct in such cases is not to open the wound unnecessarily; but to apply cold wet linen to the part, and keep up a continual evaporation from its surface, by which means its temperature will be reduced, and the bleeding suppressed.

No styptic has the property of promoting the coagulation of the blood.

All styptics create irritation on the surface of recent wounds, in which cases, therefore, scientific surgeons never have recourse to them. They are, however, judiciously used to suppress bleedings from many diseased surfaces, where the vessels seem to have lost their natural disposition to contract; and cold styptic injections may be useful in cases where hemorrhage from the womb continues after the extraction of the placenta.

8. PARTICULAR REMARKS.

When the bleeding vessel is ossified, or situated in a bony canal, a small portion of lint, introduced into its orifice, will stop the effusion of blood.

When an artery is cut across, and only partly through its diameter, it generally bleeds more profusely than when quite divided. The reason of this is, because it can neither shrink under the surrounding substance, nor contract itself sufficiently to become impervious. Hence originated the advice to divide some wounded arteries completely through. This plan, however, ought seldom to be practised; for, if the artery is large, a ligature must, after all, be applied both above and below the wound, and though it might answer when the vessel is of a moderate size, yet, compression is far preferable. Were a large artery to be cut quite through, before ligatures are applied to it, the shrinking of the vessel beneath the circumjacent parts would afterwards only increase the difficulty in tying it.

Sympathetic inflammatory fever, attended with an increase in the velocity of the circulating blood, and an augmented action of the heart and arteries, is the consequence of all considerable wounds. Hence, during its predominance, the patient is particularly exposed to the danger of fresh hemorrhage. The bleeding, occasioned by the impetuous motion of the blood, arises either from vessels, which previously effused little or no blood, or from such as did bleed, but were not effectually secured.

In this case, if the patient be plethoric, the performance of venesection is proper, the loss of venous blood being less prejudicial to the constitution, than that of arterial. The flow of blood into the wounded limb is always to be decreased by placing the part (if possible) in an elevated posture. Sometimes cold applications, sometimes compression may be advantageously tried, while, in other instances, a tourniquet, so constructed as neither to stop the circulation in too great a degree, nor hinder the return of blood through the veins, would be exceedingly useful. If, however, the arteries should be above a certain size, and the hemorrhage still continue, the vessels must be exposed, and tied.

Hemorrhages from external injuries seldom require internal means; which, if they were needed, possess in such cricumstances but questionable virtues.

The acetite of lead, taken inwardly, has been supposed to have some power in suppressing bleedings, though few surgeons are so credulous as to place any reliance upon it. Keeping the patient, however, in a cool situation, not covered with too many clothes, enjoining him to avoid all motion and exertions, and allowing him only a very low diet, are undoubtedly means well calculated to prevent bleeding. Whatever he eats and drinks should also be cold.

CHAP. XIV.

EXTRACTION OF FOREIGN BODIES FROM WOUNDS; UNION BY THE FIRST INTENTION, &c.

BESIDES hemorrhage, there is another circumstance to which we must attend before dressing a wound; namely, to remove all extraneous substances from its surface. This is universally allowed to be an object of very material importance, because, if it be not fulfilled, the wound may be brought together as nicely, as accurately, and as skilfully as possible, and every thing look well at the beginning; yet, that desirable event, union by the first intention, will not follow, but, instead of it, a severe degree of pain, considerable swelling of the circumference of the injury, extensive redness, suppuration, large abscesses, and even the worst consequence, sloughing. All these aggravated effects frequently arise from the irritation of foreign bodies in wounds; and, as an incised wound can generally be examined, at first with the utmost facility, and properly cleaned, without putting the patient to much pain, the neglect on the part of the surgeon becomes the more blameable. In other deep, narrow, or lacerated wounds, and in many gunshot injuries, it is often difficult at first to ascertain whether there are extraneous substances in the flesh, or not; or when known to be there, their exact situation cannot always be determined, but, in open incised wounds, no such difficulty and obscurity prevail, and the surgeon who closes them, without having assured himself that they are perfectly free from all extraneous matter, betrays either the most supine negligence, or an utter ignorance of his professional duty. It is true, an incised wound made with a clean sharp instrument, which has not broken, can obviously have no foreign bodies in it. But very considerable and dangerous cuts are often produced by glass, china, &c. which break at the moment, and leave some of their fragments in the flesh. Sometimes, also, the weapon with which the wound is made, is unclean, and, sometimes, dirt, gravel, &c. get into the wound, in consequence of the patient falling upon the ground immediately he receives the injury. I shall merely repeat, that, as extraneous bodies create serious irritation in every kind of wound in which they happen to be, the surgeon should always be careful to direct his attention to their removal directly he has succeeded in stopping the bleeding.

Mr. John Hunter believed, that blood, retaining the living principle, and lying on the surface of a wound, was rather useful than otherwise, in promoting the reunion of the parts; and, it was his particular opinion, that effused blood became hurtful to this process, only after being deprived of the living principle by long exposure, the effect of styptics, &c. Yet, this is a doctrine which is by no means sanctioned by the best modern surgeons, all of whom are quite convinced, that leaving any blood upon the surface of a recent wound, when its opposite surfaces are to be brought together, is highly disadvantageous, retarding the cure, and rendering union by the first intention less certain. The presence of blood in the cavity of the wound, indeed, must have the effect of producing a greater or lesser separation of the opposite surfaces, which strictly ought to touch each other, and, it seems to me, that the practice of freeing wounds as much as possible from effused blood, whether fluid or coagulated, may be successfully defended both upon theoretical and practical principles.

UNION BY THE FIRST INTENTION.

When the surgeon has stopped the bleeding, removed extraneous substances, and properly cleaned the wound, the next indication is to bring the opposite sides of the injury evenly into contact, and keep them quietly and steadily in this position, until they have grown together again. Wounds may be healed by two processes, viz. by one, in which pus is produced, and granulations and new skin are formed; and by another, in which, if it perfectly succeed at every point, no suppuration whatsoever takes place. The latter, when it can be practised, is always the most desirable, because it is not only the quickest means of cure, but also the most perfect, the part being covered by the old original skin, which is invariably stronger, and less disposed to ulceration, than what is new-formed. Surgeons have termed this way of healing wounds *union by the first intention, or adhesion*, and Mr. Hunter named the process by which it, together with many other analogous effects, is accomplished in the animal body, the *adhesive inflammation.*

The great recommendations of union by the first intention, are, celerity of cure; the hindrance of the pain and inflammation which would arise from the exposure of raw surfaces; freedom from the inconveniences of suppuration; the prevention of the deformity which would result from a large, irregular cicatrix; and the greater permanency and soundness of the cure, for reasons already mentioned.

The strong tendency which divided parts of the animal body have to grow together, when kept a certain time in contact with each other, is an important fact, of which the moderns have taken much more advantage than the ancients. In the treatment of ordinary injuries, the latter seem to have availed themselves little, or not at all, of this readiness of raw living surfaces to grow together; and, as we may see by referring to Celsus, it was principally in making attempts to repair and improve the appearance of deformed and mutilated parts, that they applied their knowledge of the fact to practice. The moderns, however, (I speak more particularly of our countrymen,) have shewn their high sense of the good purposes to which this tendency to adhesion in the animal body may be converted, by recommending and practising the immediate closure of every wound, for the keeping open of which there is not some very particular and specific reason. There are even circumstances on record, leaving no doubt of the fact, that it is not entirely impossible for parts, entirely detached from the rest of the body, to become united again, if quickly replaced. One extraordinary case, generally quoted in confirmation of this sentiment, is that mentioned by Garengeot, where a soldier's nose was bit off, yet, on being immediately restored to its natural situation, it acquired there a permanent union.* Two other examples of the re-union of pieces of the nose, which were entirely cut off, are recorded by Fioraventi †, and Blegny ‡; and well authenticated cases of similar facts in relation to other parts, may be found in different publications. § The celebrated experiments of Duhamel and Mr. Hunter, furnish also a mass of interesting evidence, completely displaying the possibility of reuniting some parts, which have been recently severed from the rest of the body. It was proved by Mr. Hunter, that the testicles of a cock, when introduced into the abdomen of a hen, contracted a vascular connection with the surface of the viscera, and lived. He ascertained, that a sound tooth might be transplanted from its socket, and acquire an union in the alveolary process of another person. Lastly, he repeated Duhamel's experiment, he cut off the spurs of a young cock, and found that they might be made to unite to its comb, or that of another cock, and grow even to a larger size than natural, in such situations. The possibility of this species of union shews, how strong the disposition of the surfaces of a fresh wound must be to grow together; particularly when it is reflected, that, in the foregoing instances, there can be, on one side, no assistance given to the union, as the separated part is hardly able to do more than preserve its own living principle, and, (as Hunter expresses himself,) accept of the union. ||

But, although this evidence is too strong to permit us to doubt the possibility of reuniting parts, which have been completely separated from the animal system, and in which the circulation of the blood has necessarily ceased for a time,

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* Traité des Opérations, t. iii. p. 55.

† Secreti Medicinali, 12mo. Venet. 1561.

‡ Zodiacus Medico-Gallicus, Mars, 1680.

§ Bossu, in Journ. de Médecine, t. xxxiii. Dr. W. Balfour's Obs. on Adhesion, with two Cases demonstrative of the Powers of Nature to reunite Parts which have been by Accident totally separated from the Animal System, 8vo. Edinb. 1814.

|| See Hunter on the Blood, &c. p. 208., and Duhamel in Mém. de l'Acad. des Sciences, 1746.

it must not be dissembled, that the attempts of this nature, which have been made by surgeons, have generally failed. This observation must not be extended, however, to other cases, in which the detached part still retains a partial and slight connection with the rest of the body, by means of only a few fibres perhaps, or a little bit of skin. As * Dr. Thomson has said, many cases are upon record, and many more have been observed, in which parts have been reunited which were completely detached, with the exception of a very small portion of cutis, a portion so small, that it is not easy to conceive that any effectual circulation could be carried on through it; and he quotes from Arcæus an instance in which the nose, and most of the upper jaw, were so extensively separated, as to hang down upon the chin, and yet were afterwards reunited. A very remarkable example of the same kind has also been lately published by Larrey †, one of whose assistants was actually about to cut through the connection which was left, when he was interrupted by Larrey himself, who happened to be on the spot. The instances in which the fingers, toes, nose, and ears have been entirely cut off, with the exception of a small bit of skin, and afterwards saved by adhesion, are so generally known, and frequently exemplified in practice, that it would be useless prolixity to dwell upon them.

The knowledge of the preceding facts cannot but prove useful in relation to surgery: it raises our confidence in the powers of nature, under circumstances in which we should otherwise entirely despair; and, with the precedents before us, we shall be induced to attempt the union of parts, and sometimes succeed, when the project would appear to any one uninformed of what has already happened in other cases, hopeless and absurd.

In promoting union by the first intention, surgery is merely to officiate as the handmaid of nature. There are only two indications to be fulfilled: the first is to bring the edges of the wound into reciprocal contact, and keep them so; the other is to avert the access of immoderate inflammation, by which the agglutination of the wound would certainly be prevented. The first object is accomplished by a proper position of the wounded part, by bandages, by adhesive plaster, and by sutures. The second is fulfilled by a strict

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* Lectures on Inflammation, p. 245.

† Mém. de Chir. Militaire, t. iv. p. 20. 8vo. Paris, 1817.

observance of the antiphlogistic regimen, and particularly, by avoiding every kind of motion and disturbance of the wound. The rest is the work of nature.

1. POSITION OF THE PART.

This is to be regulated on the principle of relaxing the wounded integuments and muscles. If the extensor muscles are injured, the joints which they move ought to be placed in an extended posture; if the flexor muscles are wounded, the limb is to be bent. When the integuments alone are cut, the same posture which relaxes the muscles situated immediately beneath the wound, also serves in general to relax the skin. In transverse wounds of muscular fibres, it is astonishing what immense effect the observance of a proper posture produces. This is never to be neglected, whatever may be the other means adopted.

2. BANDAGES.

Bandages may frequently be made to contribute very essentially to keeping the sides of wounds duly in contact with each other. This is strikingly illustrated in cases of harelip, where we see that the opposite edges of the fissure may be brought forward so as to touch, and be maintained in this position by the simple use of compresses and a bandage. Such was the mode of treatment actually preferred by M. Louis, after the operation for the harelip; and, were it not for the greater convenience and certainty of the twisted suture, it is the plan to which surgeons would yet have recourse. The uniting, or, as it was formerly called, the incarnative bandage, is one which operates in keeping the opposite surfaces of wounds applied to each other, so that the opportunity may be afforded for them to unite and grow together again.

The common uniting bandage can only be applied to wounds which take a direction corresponding to the length of the body, or limbs, and which are situated where a bandage can be used with convenience and effect. It consists of a double-headed roller, having a slit between the two heads; large enough to allow one head of the roller to pass through it with facility. The proper dressings having been put on, the surgeon is to take one head of the roller in each hand, and apply the bandage first to that part of the limb which is opposite the wound. One head of the roller is then to be brought round, so as to bring the slit precisely over the breach of continuity. The other head is then to be brought round in the opposite direction, and passed through the fissure in the roller. The bandage is next to be drawn moderately tight, and its two heads being carried round the limb again, the same artifice is to be repeated. A sufficient number of turns of the roller must be made to cover the whole length of the wound. When the wound is deep, it is recommended to place small longitudinal compresses beneath the roller, at a little distance from the edge of the wound.

As the uniting bandage can only be made use of for longitudinal wounds, which never have a considerable tendency to gape, nothing can be more absurd than the application of it with immoderate tightness. By such cruel and injudicious practice, many a limb and life have been lost; for, if the bandage be very tight on its first application, what a dangerous constriction of the limb or part must follow, when the swelling, necessarily arising from the wound, has had time to come on. It is thus, that insufferable pain and gangrenous mischief are frequently induced, when, if the part had been simply dressed, and left unconfined, every thing would have gone on most favourably. It is right to state, however, that modern surgeons are not partial to the uniting bandage, and I have no hesitation in saying, that it is a means which may be advantageously banished from practice. If it be true, that it brings the sides of deep wounds together better than adhesive plaster alone, and that it acts without the irritation arising from the application of resinous substances to the skin, it still has many inconveniencies: its total concealment of the wound, its lying in irregular folds, so as to create an uneven cicatrix, the difficulty of undoing it, and some other serious objections, might be mentioned. These reasons have rendered its employment much less frequent than in former times, and, I may say, that its use in this country is now superseded by the just preference universally given either to a common roller or an eighteen-tailed bandage, in every sort of wound for which the old incarnative bandage some years ago used to be invariably recommended.

3. ADHESIVE PLASTER.

This has been absurdly termed the *dry suture*, to distinguish it from sutures which are attended with bleeding; and it is erroneously set down in numerous surgical books, as being only applicable to superficial wounds of the skin. It is true, that adhesive plaster has no direct effect of bringing together the edges of a deep, muscular wound; but let it be remembered, that while it proves effectual in maintaining the edges of the skin in contact, it presents no obstacle to the adoption, at the same time, of a proper position, compresses, and bandages, which are means having more effect on the deeper part of the wound. It is also an error to suppose, that adhesive plaster cannot be used in situations where hair grows, or where the application is apt to become moistened. If the part be well shaved, and perfectly dried at first, the plaster will not become loose so soon as to prove ineffectual.

It is generally applied in strips, between every two of which an interspace is recommended to be left, for the purpose of allowing the discharge to escape, in the event of any part of the wound not healing in the ready manner which is desirable. Therefore, to bring the edges of the wound effectually together, and, at the same time, to leave a little room for the exit of the discharge, are the leading objects to which we ought to attend in using adhesive plaster. Hence, when the strips are broad, it is not unfrequent to cut out an oval piece of each strip, just where it crosses the wound.

Adhesive plaster is of great use, even in those wounds in which it is impossible to bring the edges into contact. By bringing and retaining the edges near each other, the strips lessen the size of the wound, while they keep surfaces in contact which have a disposition to adhere; and ultimately, when the gradual elongation of the old skin begins to take place, they succeed in bringing the separated edges together. *

Equal parts of the empl. plumbi, and of the empl. resinæ, form the composition commonly used in this country for making adhesive plaster.

A pledget of some mild simple cerate is often applied over the plasters. It is preferable to dry lint, which sticks to the plasters and ligatures, and is more troublesome to remove. If lint be necessary, it may be put over the pledget.

4. SUTURES.

Of the numerous kinds of sutures practised by the old surgeons, there are now only four ever employed. These are the *interrupted*, the *quilled*, and the *twisted*, sutures, with another one named *gastroraphe*. The twisted suture will be spoken of in the chapter on the harelip, and gastroraphe will be noticed in that on wounds of the abdomen.

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* See Thomson on Inflammation, p. 293.

INTERRUPTED SUTURE.

The curvature of the needle employed should form a segment of a regular circle. When the needle is so shaped as to be curved towards its point, and straight towards its eye, it is obvious that it is not advantageously constructed for passing through parts with facility. It should be double-edged for one-third of its length from the point, and its broadest part should be somewhat broader than the ligature, in order that the later may traverse the wound with the utmost ease.

When the bleeding has been suppressed, and all extraneous substances have been removed, the surgeon is to place the limb in such a posture, as shall enable him to bring the lips of the wound easily into contact. The needle, armed with a ligature, is then to be introduced into the right lip of the wound, at a small distance from its edge, and is to be directed across the bottom of the wound, so as to come through the left lip from within outward. The needle is now to be cut off, and the ligature tied in a bow. These sutures should always be, at least, an inch from each other. Strips of adhesive plaster, and a bandage for the support of the part, are, at the same time, usually employed.

QUILLED SUTURE.

So called from a quill being sometimes used in making it. Formerly, this means of uniting wounds was often practised, when the muscles were deeply wounded; and it was employed on the supposition that it produced a more perfect support of every part of a wound than could be effected with the preceding suture. The same kind of needle is used as for the interrupted suture; but it must be armed with a double ligature. When the double ligatures have been introduced through the lips of the wound, at as many places as the length of the wound may require, their ends are to be separated, and then tied in a bow over a piece of bougie, quill, or any similar thing, placed along each lip of the wound.

Dionis first reprobated the adoption of this suture, and it is justly rejected by the moderns as an artifice of mere ingenuity, and no real utility. A further account of any of its modifications, therefore, must appear superfluous.

In the present schools of surgery, the use of sutures is not so much recommended as it was in former days. It is now known, that, by the combined operation of position, adhesive plaster, and a bandage, almost all wounds are capable of being united as expeditiously, and well, as they could be, were sutures to be employed. Therefore, were it only to avoid superfluous pain, we ought to reprobate the practice in general. Did sutures only create a little additional pain, and no other evil, still their employment would be justifiable, if they really possessed the power of rendering union by the first intention a matter of greater certainty, in only a limited proportion of cases to which they are applied. In the cure of the harelip, and a few wounds of the face, and, perhaps, in the treatment of large wounds penetrating the abdomen, we must admit their utility. In wounds of the lips, the incessant and unavoidable motion of the part; and, in those of the abdomen, the distention, arising from the viscera, and the danger of their being protruded, are reasons which in these particular instances may account for the advantage of sutures. But, in general, the promotion of union by the first intention cannot be set forth as a valid argument, in favour of their being commonly used. Inflammation, above a very moderate pitch, always destroys every prospect of this nature, and occasions the secretion of pus, instead of the exudation of coagulating lymph. Sutures have fallen into disrepute, principally because they tend to increase inflammation. The new wounds which they make, their irritation as extraneous bodies, the forcible manner in which they drag the living parts together, and their incapacity, in general, to accomplish any useful purpose, which position, adhesive plaster, and bandages, cannot effect, are strong motives for reprobating their being commonly used. In fact it often happens, when sutures are employed, that considerable inflammation of the wound is the consequence, and its swollen edges evince marks of suppuration, unless soon relieved from the irritation of the ligatures. Frequently in this kind of case, if the surgeon be sagacious enough to cut the ligatures, and remove them in time, suppuration may still be avoided. The extensive erysipelatous redness around wounds, uncommon pain, and severe nervous symptoms, will often be found to originate from the irritation of sutures.

M. Pibrac's remarks on this subject are highly worthy of universal consideration. After relating many convincing facts, he concludes with asking, what practice the partizans of sutures would adopt, were they necessitated, as they frequently are, to cut the ligatures, and remove them ? Or, were they to find, as is often the case, that the ligatures had made their way through the lips of the wound, so as to leave them gaping ? They would then never think of introducing new sutures, but would have recourse to a bandage, in order to unite the wound.* Both this gentleman and †M. Louis have urgently recommended the entire discontinuance of the practice, and their observations are accompanied by facts which must have considerable weight. Their opinions and arguments, I confess, have made a deep impression upon myself; and if I cannot join in the sentiment that sutures ought to be entirely abandoned, I at least believe that they are still a great deal too much used. However, for lessening the employment of needles in surgery, Pibrac and Louis are entitled to great praise. Professor Thomson thinks sutures may be generally omitted, except in superficial wounds, which we wish to heal by the first intention, or in wounds where (as in those of the abdomen) it is necessary that the edges should not be allowed to separate from each other.‡ But hardly any two surgeons think exactly alike about the cases in which sutures are truly beneficial or not. Thus, I do not admit that they ought to be used as frequently as the remarks of Dr. Thomson would warrant; and it seems to me, that the majority of superficial wounds, in which union by the first intention is indicated, so far from being examples in which sutures are necessary, are of all cases, those which least require stitching. Were we to admit such as instances of the necessity for sutures, the practice would become as common again as ever it was in the less improved periods of surgical knowledge.

Such are the principal means employed for keeping the opposite surfaces of wounds in contact, until an union has taken place. The first plasters and dressings should be allowed to continue on the part at least three or four days, unless any untoward symptoms, such as excessive pain, the renewal of hemorrhage, &c. indicate the contrary. The cause of the severity of the pain should always be duly considered, and, if possible, removed: sometimes it is owing to the sutures, sometimes to the immoderate tightness of the roller, and occasionally to extraneous substances yet being lodged in the wound.

When too much inflammation is apprehended, the bandage should never be tight; and wetting it with cold water may be of use by keeping the parts cool. Perfect quietude, and an antiphlogistic regimen should also be observed. The old plan of covering the dressings with thick woollen rollers, caps, and large masses of tow, has now gone very much out of fashion, as being inconsistent with those principles which are recognized by every scientific surgeon, as best calculated to avert and lessen inflammation.

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* Sur l'Abus des Sutures, in Mém. de l'Acad. de Chirurgie, tom. iii. 4to. or tom. ix. 12mo.

† See Mémoire sur l'Opération du Bec-de-Lievre, op. cit. tom. xii. p. 118. edit. 12mo.

‡ Lectures on Inflammation, p. 287.

When the first dressings are removed, the surgeon often finds union by the first intention accomplished only at certain points of the injury; and the connection even there still requires further support. On the application of the second dressings, however, it is generally unnecessary to put on as many strips of adhesive plaster as were at first employed, and their number may be gradually lessened at each future dressing. The sutures, if there are any, should also be now withdrawn, as they can do no further good, and their continuance may excite irritation, and do harm. Throughout the rest of the treatment, also, the dressings should be light, simple, and unirritating.

I shall conclude this chapter with a few useful rules, which Professor Thomson recommends to be observed in the dressing and examination of wounds.

The first is, never to give the patient more pain from our modes of procedure, or methods of dressing, than is absolutely necessary for his present good or future security. For instance, we ought never to probe a wound, where probing can be of no use; and we should be contented to remain ignorant of those things, the knowledge of which could only gratify an idle curiosity.

Another good rule is to have all the fresh dressings perfectly ready, before the removal of the old ones. A sponge and warm water, the adhesive plaster, pledgets, lint, bandages, &c. should all be at hand, and not left to be looked for at the very moment when they are wanted.

As in many instances the removal of the dressings and the application of others take up a considerable time, we ought carefully to reflect what position will be most easy to the patient, and, at the same time, most convenient to the surgeon.

When the bandage, adhesive plaster, and other dressings, have become hard and dry, and glued together, and to the surrounding skin, by blood, or other discharge from the wound, the surgeon should soften and loosen the applications by wetting them a sufficient length of time with warm water, which is to be pressed out of a sponge upon them, a basin being held below the part for the reception of the water as it falls off the dressings. This duty is of much importance in saving the patient from a great deal of agony, which the abrupt removal of the adherent dressings would produce.

In removing the dressings which are under the bandage, we should be careful that the ligatures are not entangled, and forcibly pulled away, so as to give severe pain, and create a risk of hemorrhage.

The strips of adhesive plaster should be removed by taking hold of their ends, and drawirg them always in a direction towards the wound. Were the plasters pulled off in the contrary direction, the edges of the wound would be separated, and perhaps torn asunder again, and the process of reunion at all events disturbed. The plaster should not be pulled up, as by this proceeding the edges of the wound would be torn from the subjacent parts.

In large wounds, especially, only one strip, or at most two, should be off the injury at a time; and the part from which the plaster has been removed, having been carefully wiped with a sponge and dried, is then to be supported with a fresh strip, before any more strips are taken off. As Dr. Thomson well observes, it is from inattention to this rule that wounds are daily torn open again at each dressing, merely by the weight of the parts which have just been united.

The edges of the wound, particularly if it be large and deep, should always be held together by an assistant at the time of changing the dressings.

When there are several wounds, only one is to be opened and dressed at a time, so that all unnecessary exposure of the parts may be avoided.

At each dressing, care must be taken to prevent lodgments of matter, by placing the compresses and strips of plaster in the manner best calculated to press upon and obliterate any cavity in which the pus has a tendency to accumulate.

In dressing wounds, especially in hospitals, where frequent change of linen is not at all times practicable, the utmost attention should be paid to cleanliness, every thing filthy and offensive being removed from the ward as quickly as possible. Above all things, care must be taken not to let the matter touch the bed-clothes. In the military hospitals, the custom of laying a piece of oilskin under suppurating wounded parts, in order to keep the bed clean, is highly praiseworthy; for cleanliness in hospitals is most essential to the general health of the patients, and the favourable progress of wounds.

The frequency of dressing must be regulated by the quantity and quality of the discharge; by the situation of the injury; by the climate and season of the year; by the effects which the renewal of the dressings seems to produce; and by the feelings, and sometimes the wishes, of the patient. *

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* Thomson on Inflammation, p. 294, &c.

CHAP. XV.

PROCESS BY WHICH THE WOUND IS UNITED.

WHEN the opposite sides of an incised wound are maintained in contact by the foregoing means, they soon become permanently connected together. The vessels of the wounded surface cease bleeding, and their extremities become impervious to the blood itself, but not to the coagulating lymph, which forms the general bond of union between living parts. This uniting medium is the primitive and most simple connection that takes place between the two sides of a wound. In many cases, however, where the wound is put into a state of apposition, before the hemorrhage has had time to cease, no doubt a coagulum of blood itself constitutes the first bond of union, and wounds must thus be frequently united through the medium of red blood. I have, however, already explained, that the best practical surgeons prefer the plan of making the surface of the wound as free from blood as possible, before bringing the opposite sides of the injury into contact. It is found, that union by the first intention will more certainly follow this mode of proceeding. However, the reader is not to understand, that he is to defer bringing the sides of a wound together, until every little oozing of blood is at an end. The long exposure of the wounded surface would be very injurious, and tend to defeat the grand object in view, direct adhesion, without suppuration.

We have examples of an union, very similar to that by the first intention, in bones which have been fractured; in tendons which have been ruptured; and even sometimes in muscles which have been wholly or partially torn asunder, without any division having been produced in the skin which covers such parts. In the sudden and violent division of these textures, blood is always effused between the divided parts, and into the surrounding cellular membrane. When this extravasated blood is not very considerable in quantity, and when the parts from which it has been effused are not too severely injured, it is observed to be gradually absorbed, in proportion as the process of union advances. If the divided surfaces be examined a few hours after the accident, they will be found to be covered with coagulating lymph. This substance, indeed, appears to be effused very quickly after the injury. Professor Thomson found, that, in animals, a distinct layer of it was effused over their wounds in less than four hours.[*] But, says he, whatever may be the period at which it is first formed, it is now well ascertained that, in healthy subjects, when fractured, torn, or ruptured surfaces, to which the external air has not been admitted, are properly covered with this layer of coagulating lymph, and kept in contact, they speedily coalesce, and that, by this lymph becoming a living intermedium, the continuity of the divided part is at length restored. Appearances, precisely similar to such as happen in divisions without communication with the external air, take place in simple incised wounds, the edges of which have been brought together before, or soon after the bleeding has ceased. If a wound of this kind be torn open soon after its reunion, the surfaces, which had been united, are seen covered with a substance resembling jelly, which is the coagulating lymph, or fibrin of the blood. By some it is supposed, as I have said, that this lymph is poured out from the smaller vessels which have been cut; but Professor Thomson inclines to the opinion, that it is chiefly, if not wholly, formed by the secreting action of the capillary vessels of the divided surfaces.[†]

The simple agglutination of the sides of a wound together, is what may be considered as taking place directly they have been brought into contact. The next step, in the process of union by the first intention, is the generation of vessels in the coagulating lymph, or blood; and this is soon followed by an intercourse between the vessels of the two sides of the wound. The manner in which the new vessels arise in the uniting medium, as well as the way in which the inosculation of the divided vessels happens, are at present only matters of conjecture. I have introduced almost as much as is known upon this abstruse subject in the chapter on inflammation. Mr. Hunter conceived that blood and coagulating lymph, as long as they retained the living principle, possessed the faculty of generating vessels within themselves, quite independently of any adjoining surfaces; and in the growth of the chick, there are unquestionably some appearances in favour of this opinion. Professor Thomson delivers the following statement: the coagulating lymph, soon after its exudation, becomes penetrated with blood-vessels, which proceed from the divided surfaces, appear to join in the process of reunion by open extremities, or, in other words, to inosculate with one another. The blood now circulates freely through the new-formed channels of communication established between the vessels, which penetrate the lymph effused upon the surfaces formerly divided; and the vessels which shoot into the lymph, often acquire in the course of a few hours a size which renders them capable of being injected. The precise manner in which the vessels are extended into the coagulating lymph is still unknown. It has not been positively settled, whether it is the divided vessels which penetrate the lymph. The extremities of the larger branches are closed with the effused lymph, and removed by means of it and their natural elasticity to a distance from each other. Dr. Thomson regards these circumstances as insurmountable bars to their immediate inosculation; and he remarks, that, if it be the closed vessels which are prolonged into the lymph, each small artery must obviously have its corresponding vein. But, says he, the inosculation, or direct union of the small blood-vessels from the opposite surfaces of the wound, however difficult to conceive or explain, is a truth undeniably established. * He then adverts to Duhamel's experiment, which fully proves, that, in the reunion of parts which have been divided, the blood-vessels from the opposite surfaces inosculate directly, and do not merely pass one another. Duhamel broke the legs of six chickens, and, after the bones had reunited, he cut through about one-third of the soft parts, covering the callus, or new bone. When the wound had healed up, he divided another third part, and in the same manner the remaining third part, sparing neither blood-vessel, tendon, nor nerve. Only one of the six chickens survived these cruel operations; but upon injecting the artery at the upper part of the thigh, the injection was found to have penetrated to the lowest part of the leg. "I cannot say (Duhamel remarks) whether the large vessels, filled by the injection, were dilated capillary vessels, or the large vessel of the leg, which had been reunited; but the experiment proves irrefragably the inosculation of the blood-vessels." Later observations than those of Duhamel (says Professor Thomson) have shewn, that it is by the small vessels, and not by the larger trunks, that the inosculations are formed, by which the divided parts of a limb are supplied with blood: nor does he accede upon this point to the sentiment of Hunter, who conceived that he had certainly succeeded in observing inosculation on the tunica conjunctiva of the eye, the vessels of which are frequently divided by surgeons in cases of ophthalmy. He states, that the two ends of the cut vessel are seen to shrink; but, after a little while, they are perceived to unite, and the circulation is carried on again. †

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[*] On Inflammation, p. 209.

[†] Op. cit. p. 210.

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* P. 212.

† On the Blood, p. 193.

The celerity with which the process of union by the first intention is completed, is a circumstance that must excite the admiration of the philosophical surgeon. In the short space of seventy-two hours, the wound produced by an amputation of the thigh, is often securely united through its whole extent, without any suppuration, except just where the ligatures are situated. Incised wounds of a moderate size may, in general, be completely healed by this method in forty-eight hours. How different, then, is the surgery of the present day to that of half a century ago, when the bigoted prejudices of our ancestors deterred them from doing, not only what was most salutary, but most simple! The complicated business of accomplishing digestion, incarnation, and cicatrization, is now reduced to the easy duty of bringing the edges of a clean cut wound into contact, and maintaining them so until they have grown together.

As a modern surgical writer has observed, " there is no wound, in which we may not try with perfect safety to procure this adhesion; for nothing surely can be more kindly when applied to a wounded surface, than the opposite surface of the same wound: it has been but just separated from the opposite surface: it may immediately adhere to it: though it do not adhere, no harm is done; still the wound will suppurate as kindly, as freely, as if it had been dressed with dry lint, or some vulnerary balsam, or acrid ointment. If only a part suppurate, while one half perhaps adheres, then half our business is done; and, in short, this simple way of immediately closing a wound is both natural and safe." * If I were to instance any one circumstance, in which I think the excellence of English surgery strikingly displayed, I should be inclined to cite our partiality to the mode of curing wounds by the first intention. †M. Roux, in his criticisms upon this part of our practice, may convince his readers how sincerely he believes what he says; for he actually fancies we have been, as it were, forced into the custom of healing up wounds as quickly as we can, because, unfortunately, in this country, we have not, as he conceives, a sufficiency of the requisite materials for dressing wounds, which are to heal by suppuration! But, I doubt whether he will be joined by any surgeons on this side of the channel in the belief, that it would be better to abandon the practice of adhesion altogether, than make it an exclusive method of treatment. He particularly mentions the wound after castration as unfit for

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* Discourses on the Nature and Cure of Wounds, by John Bell, p. 14. edit. 3.

† Parallèle de la Chirurgie Angloise avec la Chirurgie Françoise, p. 117. et suiv. 8vo. Paris, 1815.

this plan, because the edges cannot be easily put into a state of co-aptation, unless a considerable piece of the scrotum be cut away, and sutures be used; and also because the closure of the wound is attended with a risk of a collection of blood taking place in its cavity, and nature is nearly as long in effecting a cure, when the sides of the wound have been brought together, as when they have not. But if the principle were to be admitted, that the possibility of bleeding within a wound is an adequate reason for filling it with charpie, and not attempting to heal it by the first intention, we ought to renounce this last beneficial practice in every instance, where the surface of the wound is extensive, and its cavity large, as after amputation, the removal of a breast, the extirpation of tumours, &c. But, even supposing the scrotum should sometimes become filled with coagulated blood, of which M. Roux is so much afraid, it may then be inquired, which of two patients would be the best circumstanced, one with the scrotum crammed with charpie, or another with the same part distended with coagulated blood? Which will suffer least pain, have the most moderate suppuration, and get well in the shortest time? If the answer to these problems be so doubtful, as not to admit of being readily delivered, surely we may be allowed to argue thus: that if, when the evil complained of by M. Roux does really occur, the patient is not decidedly worse off than when such disaster does not happen, but the particular treatment recommended by that gentleman is followed, how much better it must be to let the patient at all events have the chance of a considerable portion of the wound uniting; for when this is accomplished, (to use Mr. John Bell's phrase) half our business is done.

But, if any wound require more strongly than others the approximation of its edges, and to be healed, if possible, by adhesion, it seems to me, that it is the incision made in the Hunterian operation for aneurism. Here the wound should be closed to let the artery lie quietly amongst its natural connections, undisturbed by the contact of any dressings, or other extraneous substances, by which the adhesion of its sides might be prevented, its ulceration induced, and secondary hemorrhage occasioned. But, extraordinary as it may appear, this is another example of our practice selected by M. Roux to illustrate our blind predilection for healing wounds by the first intention. The wonder ceases, however, when we find that M. Roux conceives ligatures of reserve (ligatures d'attente) advisable means in operations for aneurism; for they are undoubtedly awkward things in a wound which ought to be healed as quickly as possible, and they put union by the first intention out of the question. But in London, where the inutility and dangers of these ligatures of reserve are well understood, a practice, which tends to abolish their use, will be welcomed, as bringing with it another high recommendation.

CHAP. XVI.

PUNCTURED WOUNDS.

PUNCTURED wounds are not only dangerous, on account of their frequently extending to a considerable depth, and injuring large blood-vessels, nerves, and viscera of importance, they are also dangerous, inasmuch as they frequently give rise to violent and extensive degrees of inflammation. It is not uncommon to see formidable collections of matter follow wounds of this description, especially when the instrument with which they have been made has penetrated deeply through an aponeurosis or fascia. The extension of inflammation along the continuous textures from the original seat of the puncture, and the formation of matter under the fasciæ, are two of the most remarkable local phenomena, which are particularly liable to arise from punctured wounds.* Stabs, and all other punctures, are not simple divisions of the fibres of the body: they are attended with more or less contusion and laceration. Hence, there is not the same readiness to unite, which we observe in wounds made with sharp cutting instruments; and when the weapon has entered deeply through ligamentous expansions, the inflammation excited often spreads very extensively, attended with most severe pain in the parts affected, great tension, swelling, and abscesses running under the fasciæ to an alarming extent. Violent symptomatic fever, and great agitation of the nervous system, very often follow the infliction of a punctured wound; effects which have been attributed to the injury of tendons, or nerves. This doctrine, however, is now nearly exploded. Surgeons frequently see nerves of considerable size and large tendons wounded, without the occurrence of great constitutional disorder: therefore it cannot be the mere injury of these parts which is the occasion of all the general indisposition. The explanation of the fact, that great derangement of the system is very apt to follow punctured wounds, is not yet unfolded in a satisfactory manner; but the fact itself is fully established by the surgical records of all ages, and on the firm basis of daily experience.

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* Thomson's Obs. made in the Military Hospitals in Belgium, p. 29. 8vo. Edinb. 1816.

More is to be feared, I think, from the frequent depth of a stab, or puncture; the roughness and violence with which the injury has been inflicted; and the many different textures pierced; than from the circumstance of tendons, or nerves, happening to be wounded. Amongst the worst kinds of general indisposition, more frequently following punctured than other descriptions of wounds, is tetanus; a complication still oftener seen in warm climates than our own.

Punctured wounds are generally more dangerous and difficult to cure, than cuts and sabre wounds, though much depends upon the nature of the parts injured. When immense swelling and inflammation follow, large abscesses form; extensive erysipelatous redness comes on; a large artery, or important viscus is wounded, and blood, or other fluid extravasated: the case is undoubtedly of a serious and dangerous nature. The same remark may be made when tetanus, or violent symptomatic fever, and great agitation of the nervous system, complicate the injury.

TREATMENT OF PUNCTURED WOUNDS.

In this part of practice, erroneous suppositions have very commonly led to very serious abuses. The unlimited idea, that the severe consequences of most punctured wounds are in a great measure owing to the narrowness of their orifices, induced numerous surgeons to practise, indiscriminately, deep and extensive incisions, for the purpose of rendering their external communication considerably wider. To have constantly in view the conversion of such injuries into simple incised wounds, was always a maxim, strongly insisted upon, and set forth as the reason of the above method of treatment. The doctrine even occasioned the frequent dilatation of punctured wounds by the still more absurd and cruel employment of tents.

Certainly, if the notion were true, that an important punctured wound, such as the stab of a bayonet, is actually changed into a wound, partaking of the mild nature of an incision, by the mere enlargement of its orifice, the corresponding practice would be highly commendable, however painful it might be. But the fact is otherwise; the rough violence done to the fibres of the body by the generality of stabs, is little likely to be suddenly removed by an enlargement of the wound. Nor can the distance, to which a punctured wound frequently penetrates, and the number and nature of the parts injured by it, be at all altered by such a proceeding. These, which are the grand causes of the collections of matter, which often take place in the cases under consideration, must exist, whether the mouth and canal of the wound be enlarged or not. The time, when incisions are proper, is when there are foreign bodies to be removed, abscesses to be opened, or sinuses to be divided. To make painful incisions sooner, than they can answer any end, is both injudicious and hurtful. They are sometimes rendered quite unnecessary by the union of the wound throughout its whole extent without the least suppuration.

It is true, that making a free incision, in the early stage of these cases, seems a reasonable method of preventing the formation of sinuses, by preventing the confinement of matter, and, were sinuses an inevitable consequence of all punctured wounds, for which no incisions had been practised at the moment of their occurrence, it would undoubtedly be unpardonable to omit them. To many this may seem a very specious, and fair pretext for making a free incision to enlarge a punctured wound. Fair, however, as it may appear, it is only superficially plausible, and a small degree of reflection soon discovers its want of real solidity. Under what circumstances do sinuses form? Do they not form only where there is some cause existing to prevent the healing of an abscess? This cause may either be the indirect way, in which the abscess communicates externally, so that the pus does not readily escape; or it may be the presence of some foreign body, or carious bone; or lastly, it may be an indisposition of the inner surface of the abscess to form granulations, arising from its long duration, but removable by laying the cyst completely open to the influence of the air. Thus it becomes manifest, that the occurrence of suppuration in punctured wounds is only followed by sinuses when the surgeon neglects to procure a free issue for the matter after its accumulation, or when he neglects to remove any extraneous bodies. But, as dilating the wound, at first, can only tend to augment the inflammation, and render the suppuration more extensive, it ought never to be practised in these cases, except for the direct objects, of giving free exit to matter already collected, and of being able to remove extraneous bodies palpably lodged. I shall once more repeat, that it is an erroneous idea, to suppose the narrowness of punctured wounds so principal a cause of the bad symptoms, with which they are often attended, that the treatment ought invariably to aim at its removal.

Recent punctured wounds have absurdly had the same plan of treatment applied to them as old and callous fistulæ. Setons and stimulating injections, which in the latter cases sometimes act beneficially by exciting such inflammation, as is productive of the effusion of coagulating lymph, and of the granulating process, can never prove serviceable when the indication is to moderate an inflammation, which is too apt to rise to an improper height. The counter opening, which must be formed, in adopting the use of a seton, is also an objection; and though French authors have given us accounts of their having drawn their setons across patients' chests, in cases of stabs, they would find some difficulty in making the practice seem unattended with harm, much less productive of good The candid, and judicious surgical reader should not always think a plan of treatment right, because the patient gets well; for, there is an essential difference between a cure, promoted by really useful means, and an escape, notwithstanding the employment of hurtful ones.

Why, however, should we mention the use of a seton? What good can possibly arise from it? Will it promote the discharge of foreign bodies if any are present? By occupying the external openings of the wound, will it not be more likely to prevent it? In fact, will it not itself act with all the inconveniences, and irritation, of an extraneous substance in the wound? Is it a likely means of diminishing the immoderate pain, swelling, and extensive suppuration, so often attending punctured wounds? It will undoubtedly prevent the external openings from healing too soon; but cannot this object be effected in a better way? If the surgeon observe to insinuate a piece of lint into the sinus, and pass a probe through its track once a day, the danger of its closing too soon will be removed.

The practice of enlarging punctured wounds by incisions, and of introducing setons, is often forbidden by the particular situation of these injuries.

From what has been already stated, the reader must be aware, that I do not follow the bulk of surgical writers in recommending the indiscriminate dilatation of the orifices of punctured wounds; nor the use of the knife, for the purpose of preventing mischief only expected and apprehended, but not certain of taking place. Whenever I have attended bayonet, or other punctured wounds, unattended with any particular complication, I have always observed nearly the same principles as are now so generally approved of in cases of gunshot wounds. I have abstained from dilating the orifice of the injury, except when it was necessary, either to get at a bleeding artery in the first instance, or to give a freer egress to the discharge in a later stage of the case. I have given the preference to mild, simple, unirritating and superficial dressings. I have not placed much faith in the utility of enveloping the parts in a tight bandage; but, after applying the first superficial dressings, have usually covered the limb or part with linen wet with the lotio plumbi acetatis diluta, or cold water. Whenever a roller was used, in the beginning of the case, it was not with a view of making pressure, but of retaining the dressings. The wound having been dressed, I then put in practice all such means as are generally deemed most efficient in preventing and diminishing inflammation; such as venesection, the exhibition of aperient saline medicines, low diet, &c. When the pain was very severe, opiates were prescribed, and on the access of much inflammation and swelling it was an invariable rule with me to be sure that the bandage was slack. On the whole, I believe, that the application of superficial dressings and cold washes is the best practice for the first twenty-four hours after the receipt of a punctured wound. But if after this period the pain should increase, and the swelling and tension become more and more considerable, the surgeon may then remove the linen and bandages, and apply from six to a dozen leeches to the neighbourhood of the wound. He may also substitute for the cold lotions the use of fomentations and emollient poultices, under which is to be laid over the orifice of the wound a small pledget of spermaceti cerate, or other simple ointment. The poultices and fomentations are to be renewed twice a day, and the leeches repeated, if thought necessary.

Sometimes, under this treatment, the surgeon is agreeably surprised to find the consequent inflammation mild, and the wound speedily united by the first intention. More frequently, however, in cases of deep stabs, the pain is intolerable; and the inflammatory symptoms run so high, as to leave no hope of avoiding suppuration. In this condition, an emollient poultice is the best local application; and, when the matter is formed, its discharge is to be procured, either by dilating the original wound, or by making one or more incisions in other places, as may seem most advantageous. In short, the treatment must then conform to the principles already noticed in the chapter on suppuration.

CHAP. XVII.

CONTUSED AND LACERATED WOUNDS.

THE instruments, which have the effect of producing what is termed a *contusion*, are either of an ordinary description, such as a cudgel, a stone, &c.; or they consist of balls, bullets, and other metallic bodies, which are impelled into the flesh with immense velocity by the explosion of gunpowder. Indeed, a forcible collision of any blunt, obtuse, hard body against parts of the living body must contuse, and often at the same time wound them. Gunshot wounds, strictly speaking, are only examples of severely contused wounds, though surgeons find it expedient generally to treat of them as distinct and peculiar cases. And when it is recollected how many difficult, intricate, and momentous questions, the subject of gunshot wounds embraces, the necessity of considering it by itself is immediately manifest.

The blunt weapons, or obtuse hard substances, which being applied with violence to any part of the living body, bruise, rupture, and otherwise hurt the fibres and vessels, may produce two different species of injury. First, they may more or less forcibly compress and crush the parts, upon which they act, so as to disorder the texture of those organs which are situated under the integuments, without causing, however, any breach of continuity in the skin itself. This is the case, which is familiarly called a *bruise*, or *contusion*, of which one of the worst examples is seen in the effects of cannon-balls, which graze the surface of the body, and crush the muscles and other deep-seated parts, while the skin itself remains unbroken. Secondly, a hard blunt body violently striking against parts may produce at once a solution of continuity, extending through the skin and sometimes also through other textures: this kind of accident is what surgeons name a *contused wound*. The latter injury more commonly follows, when the surface of the contusing weapon is not very broad. The cases which rank as simple contusions I shall consider in another chapter.

The majority of wounds are attended with some degree of contusion. Those which are inflicted by the blunt edge of a sabre, or by the obtuse point and wedge-like end of a bayonet, are as much contused as punctured wounds; and hence, like other contused wounds, they do not often admit of being united by the first intention. It must be confessed, indeed, that all our endeavours to reunite the sides of a contused wound, however skilfully directed, generally fail. An agglutination of the parts at most only takes place at the bottom of the wound, in which situation the flesh has suffered less contusion, the violence having spent itself, as it were, upon those parts upon which it first operated. Hence, suppuration of the external portion of the wound is mostly unavoidable. Still, the attempt at re-union ought to be made; for, if only the bottom of the wound should heal by the first intention, it will be a great advantage gained, more especially, when the surface of a bone has been exposed, and uncovered by the injury. In bringing the sides of contused wounds nearer together, however, the surgeon is not to attempt to do it with the same closeness, and accuracy, as in the instance of an incised wound. The injured parts would not bear the pressure, and the means requisite for this purpose; and it may be laid down, as an established rule, that nothing is more hurtful in cases of contused wounds, than much pressure, either from strips of adhesive plaster, or from rollers. In these cases, sutures are also totally unjustifiable; and I think I have seen several examples, in which a rash determination of the surgeon to close large contused wounds with stitches, tight strips of plaster, and bandages, had no inconsiderable share in bringing on the rapid and fatal gangrene which carried off the patients. When I say, therefore, that a contused wound ought to be closed, and that its opposite surfaces should be brought nearer together, in order that the chance of some part of the injury uniting by the first intention may be taken, I do not mean to recommend dragging the parts together by main force, or placing them in a state of constriction. On the contrary, I think, that they ought to be left quite unconfined, the adhesive plaster being used very sparingly, and so put on as rather to hold the loose parts nearer each other, than to press and draw them into contact. Nor should the wound be covered with much plaster, as one or two strips will suffice for the object in view, and a greater number would create irritation, besides hindering other better dressings from touching the raw surfaces. Merely a strip or two are to be applied at such points, as seem most advantageous, for lessening the exposed surfaces, and all constriction should be most carefully avoided. That the practice, here advised, may be followed by a beneficial result, is proved by daily experience; and theory would lead us to expect such good, when we remember that, by preventing the wound from gaping in the manner it would otherwise do, we not only afford an opportunity for parts of it to reunite, but at once diminish an inevitable cause of inflammation and suppuration, viz. the continued exposure of a raw surface. Contused and lacerated wounds not only differ from incised wounds in the circumstance of being more disposed to suppurate, and slough, and more difficult to heal by the first intention, they differ also in the particularity of not usually bleeding much: sometimes, not even when the largest arteries are lacerated, as must be the case when whole limbs are torn away, in consequence of becoming entangled in different kinds of machinery. This indisposition to hemorrhage is not altogether a favourable omen, because though the patient runs less chance of bleeding to death in these cases, than in cut wounds, yet the very circumstance of the large vessels not pouring out blood evinces, that the violence, contusion, stretching, and other injury, done to the parts, in addition to the mere division of them, must have been excessively severe, and that the danger of the subsequent inflammation, suppuration, and sloughing of the parts, is likely to more than counterbalance any advantage proceeding from the absence of hemorrhage.

We shall not find, in all the records of surgery, any facts more extraordinary, than those which have been published at different periods on the subject of whole limbs being torn away, not only without hemorrhage, but without any other fatal effects. The cases of limbs torn off, related by Cheselden in the Philosophical Transactions, by La Motte in his Traité des Accouchemens, by Mr. Carmichael in the 5th vol. of the Edinb. Medical Commentaries, and others in the 2d vol. of the Mém. de l'Acad. de Chirurgie, are some of the most remarkable.

All lacerated and contused wounds should be treated according to common antiphlogistic principles. When the injury is extensive, and attended with a great deal of contusion, venesection is to be practised, and any moderate oozing of blood from the surface of the wound may be encouraged by the use of fomentations. With respect to dressings, they should always be of a mild unirritating quality. After lessening by a strip or two of adhesive plaster the exposed cavity of the wound, when this is large and the surrounding skin loose, or detached from the subjacent parts, the wound may be covered with pledgets of the unguentum ceræ, over which should be laid an emollient poultice. As the first dressings should not be removed for at least 24, or 36 hours, care ought to be taken to put into the poultice a sufficient quantity of sweet oil to prevent it from drying too soon. Afterwards, however, the dressings may be changed once, twice, and in bad cases, even thrice a day, for as soon as the sloughs begin to separate and suppuration commences, the necessity of changing the dressings and poultices more frequently is evident. In severe cases, fomentations may be used at the periods of dressing, as nothing will be found more effectual for the relief of the pain. The employment of leeches also should not be forgotten, as a valuable means of palliating inflammation. Professor *Asalini of Milan has lately written strongly in praise of the good effects which are produced by the application of cold washes to parts which have received contused wounds; and I believe the plan is particularly useful in the first instance, when it is a great object to check the increase of extravasated fluids in the surrounding parts. I think cold applications are also highly proper when contused wounds are disposed to bleed more than usual, and yet, no particularly large vessel can be found injured. But, in other periods and states of these injuries, I prefer emollient dressings; and indeed it may be questioned, whether the employment of cold lotions at first may not be objectionable, inasmuch as they tend to stop the oozing of blood from the surface of the wound; a thing which is considered by many surgeons extremely beneficial, and an object which they think ought to be promoted even by the use of fomentations. This is a point, however, which comparative and unprejudiced experience is alone capable of deciding.

If, in cases of lacerated and contused wounds, the surgeon is less frequently, than in incised wounds, called upon to take measures for stopping bleeding immediately after the accident, he finds greater occasion for attending to another important duty, imposed upon him in his professional attendance upon wounded persons in general: I allude to the early removal of all foreign bodies and extraneous substances from the wound. Cuts are usually made with clean sharp instruments; but contused and lacerated wounds often occur in a manner which renders them particularly liable to be complicated with the lodgment of extraneous matter.

With regard to lacerated wounds, the same practical remarks apply to them, which have been offered on the subject of contused wounds; but the prognosis is generally considered more unfavourable, and in warm climates tetanus is alleged to be a very frequent consequence of such injuries.

As soon as the surface of a contused or lacerated wound has thrown off its sloughs, suppurated, become clean, and

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* Manuale di Chirurgia, 12mo. Milano, 1812.

evinced a tendency to form granulations, the poultices are to be discontinued, and simple dressings employed. These are afterwards to have their quality altered, according to the future appearances which the sore may assume; but further directions, respecting the management of the case after it has arrived at this stage, will be found in the chapter on ulcers.

Some contused and lacerated wounds would be inevitably followed by a rapid mortification of the limb, and the patient run the greatest risk of losing his life, were amputation not performed immediately after the receipt of the injury. These are generally examples, in which the soft parts are extensively and deeply wounded, and large blood vessels and nerves also injured. When mortification attacks patients so circumstanced, it is the gangrene which Larrey has called *traumatic*, and in which he and some other modern surgeons conceive that amputation may often be done with success, though the mortification has not ceased to spread at the time of the operation. This practice had also its advocates in former days; but, since the time of Mr. S. Sharp and Mr. Pott, the rule of never attempting amputation, before a line of separation has begun to form between the dead and living parts, has been taught in every school, and implicitly followed by every practitioner. From what has been said on this subject, however, in the chapter on mortification, the propriety of the advice so confidently given by Sharp and Pott becomes at least questionable in the circumstances, which I have there pointed out.

As for the general treatment, also, of lacerated and contused wounds, which are in a gangrenous or sloughing state, I must refer to the same chapter on mortification.

CHAP. XVIII.

OF GRANULATIONS AND CICATRIZATION.

GRANULATIONS are formed by an exudation of the coagulating lymph from the vessels of the wounded or exposed surface. Into this substance, it is probable, both the old vessels extend, and in it new ones are formed, so that granulations become highly vascular. The vessels of granulations pass from the original parts beneath to their bases, and thence towards their external surface, in almost parallel lines.

Granulations have the same disposition to secrete pus as the surface from which they are produced.

The surfaces of granulations are very convex, having a great many points, or small eminences, so as to appear rough. The smaller these points are, the more healthy we find the granulations. The colour of healthy granulations is a deep florid red. When of a livid colour, they are commonly unhealthy; and such an appearance denotes that the circulation of the blood in them is languid. Position produces this livid hue, by retarding the return of blood. This is the reason, why some sore legs are so backward in healing, when the patients are allowed to stand and walk.

Granulations, when healthy, and situated on an exposed, or flat surface, rise nearly to the level of the surrounding skin, and often a little higher; but when they exceed this, and assume a growing disposition, they are unhealthy, becoming soft and spongy, and losing the power of producing new skin.

Healthy granulations are always prone to join with each other, and their vessels soon begin to inosculate.

Granulations do not possess the powers of the original parts of the body; and consequently are very subject to mortify, or be absorbed.

These new substances must be supplied with nerves and lymphatics; how tender they frequently are every one knows; and it is equally well known, that medicines, applied to the surface of ulcers, sometimes find their way into the circulation, by means of absorption.

Granulations partake of the same qualities, whether they grow from the surface of a bone, or of the soft parts.

It is, by the foregoing process, that nature fills up the hollows of deep wounds which cannot have their edges brought into contact, and it is by the same steps that she succeeds in filling up the cavities of abscesses. The work, however, is not quite reducible to this simplicity. All modern practitioners observe, that as soon as the formation of granulations commences, the diameter of the wound becomes diminished from every two points of its circumference, even before any new skin appears to be formed. The natural elasticity of the skin, and the contraction of muscles, satisfactorily account for the separation of the edges of a wound. But how these edges become approximated, during the granulating process, is not so well understood. It has been said, that it arises from the diminution of the swelling which surrounds the wound.

This is by no means a satisfactory explanation, because we know, that the separation of the edges proceeds from a different cause, and takes place prior to the swelling, and immediately on the occurrence of the wound. Mr. Hunter attributed the beneficial effect to a contraction of the granulations. He says, "The contraction takes place in every point, but, "principally, from edge to edge, which brings the circum- "ference of the sore towards the centre, so that the sore be- "comes smaller and smaller, although there is little or no "new skin formed." This contraction of granulations takes place in a greater degree, and has a greater effect, when there is a looseness of the parts, on which they are formed. When they are formed on parts naturally fixed, as the skull, shin, &c. the contraction is impeded.

The contraction of granulations is not confined to open wounds; it takes place in the cavities of abscesses, which by this means contract like the urinary bladder, till little or no cavity is left. When the granulations cannot contract further, if any cavity be remaining it is obliterated by the opposite granulations growing into each other.

Besides the contractile power of the granulations, there is also a similar power in the surrounding edge of the cicatrizing skin.

As the granulations contract, the integuments become extended over the part which has been deprived of skin. Mr. Hunter thought this elongation of the old skin not the mechanical effect of its being stretched, but the consequence of what he would term *interstitial growth.*

The contraction of granulations appears one of the most beautiful examples for illustrating the wisdom with which the natural principles of our body have been established. By it the formation of much new skin is rendered unnecessary; a great advantage, as parts originally formed are much fitter for the purposes of life than those which are newly formed. By it, wounds which, from chirurgical neglect, have lost the opportunity of uniting by the adhesive inflammation, and others, which must necessarily heal in a more circuitous manner, are ultimately brought almost into the same state as if they had been united by the first intention. The cicatrix, compared with the original breadth of the wound, is, by this beneficial process, often made as one to three.

After the whole wound is covered with skin, the remains of the granulations beneath it still continue to contract, till hardly any thing more is left than what the new skin stands upon. This is a very small part, in comparison with the first formed granulations *; and, in time, it loses more of its apparent vessels, and becomes white, and like ligament.

When a wound begins to heal by the granulating process, the surrounding old skin, near the granulations, no longer exhibits the glossy redness, about one-fourth, or one-half of an an inch in breadth, which it previously shewed. The angular margin of the skin becomes converted into a roundish, smooth, and white boundary; and the nearer to the cicatrizing edge the whiter it is. This white substance Mr. Hunter suspected to be a beginning cuticle.

Skin is a very different substance, with respect to texture, from the granulations, upon which it is formed. Whether it is a new matter, deposited on the granulations, and produced by them, or only the surface of the granulations themselves changed, is not easily determined.

The new skin most commonly takes its rise from the adjacent old skin, as if elongated from it; but this is not regularly the case. I remember a man who was dreadfully burnt over the greater part of his body, in consequence of which he had extensive sores, occupying nearly the whole surface of some of his limbs. When these ulcers had considerably diminished, the power of producing skin seemed to lessen at the edges, but, at the same time, new portions of skin made their appearance at various parts of these ulcers, standing (as Mr. Hunter ingeniously describes) upon the surface of the granulations like little islands. Mr. Hunter was of opinion, that this production of skin, in the centre of sores, never happened the first time of their being sores. In the patient just mentioned, whom I saw in Mr. Ramsden's private practice, and attended a long while, the contrary fact took place.

In general, the surrounding skin seems to communicate a disposition to the surfaces of the adjoining granulations to form skin; just as bones give an ossifying disposition to granulations formed upon them.

The new-formed cutis is neither so yielding nor so elastic as the original. It is also less moveable, and destitute of the furrows observable on the old skin. At first, it is extremely full

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* The effects of the contraction of granulations are noticed by Camper. After adverting to the stains of gunpowder remaining for life in the skin, he observes: " Non sine probabilitate inde concludi posse mihi visum fuit, cutem nunquam regenerari: quod enim in amputatis cruribus, brachiis, ac mammis videmus, non est cutis regeneratio, sed contractio, circa nudam alias manendam plagam. Hinc parvæ cicatrices, licet insignes, ablatæ fuerunt partes." See Demonstrationum Anat. Pathologicarum, lib. 1. p. 2. fol. Amstel. 1760.

of vessels; but, afterwards, both it and the granulations beneath become free from visible vessels, and therefore white. The surrounding old skin is puckered into loose folds, while the new constantly retains a stretched shining appearance.

The production of cuticle, from the new cutis, is a much more easy process than the generation of skin. The formation of skin is chiefly progressive from the surrounding cutis; but the cuticle is frequently formed at once, equally from every point of the cutis.

The rete mucosum is not so readily formed as the cuticle; for in blacks a cicatrix remains whitish a considerable time, and sometimes even throughout life.

CHAP. XIX.

GUNSHOT WOUNDS

ARE produced by hard, obtuse, generally metallic bodies, like cannon balls, bullets, fragments of bomb shells, &c. which being violently propelled by the force of exploded gunpowder are driven into, or even quite through, the injured parts. There are also some exceedingly severe gunshot injuries, as we shall presently explain, in which the ball contuses and crushes the flesh, and sometimes breaks the bones themselves, while the integuments remain unbroken over all this concealed and often unsuspected mischief. Nothing can be more correct than Mr. Hunter's observation, that the differences of gunshot wounds are referrible to three principal causes, viz. the kind of body projected, the velocity of that body, and the nature of the parts injured. *

Former surgeons, seeing the terrible mischief frequently arising from gunshot wounds, entertained a suspicion that the injured parts were either dreadfully burnt by the heat of the projected body, or were irritated by the presence of poison, as well as by mechanical violence. We learn from Paré, that while the King of France was besieging Turin, the besiegers and the besieged mutually believed that their enemies had poisoned their balls, so cruel and intractable were the wounds; but after the taking of the city the soldiers of both parties met, and then they saw that their own clean and unpoisoned

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* Hunter on the Blood, Inflammation, and Gunshot Wounds, p. 523. 4to.

balls had made these cruel wounds. The moderns, better acquainted with the laws of projectiles, and the component ingredients of gunpowder, rightly attribute the ill consequences of gunshot wounds to the violence, contusion, and laceration, inflicted on the wounded parts. Reason and experience prove, that a ball, however great the rapidity of its motion, never acquires in its course any perceptible degree of heat; and that there is nothing poisonous in the composition of gunpowder is now universally known. The circumstance of the violence being produced in general by so obtuse a body as a musket ball, and often done with immense velocity, is fully sufficient to account for the usual severe consequences of these injuries. Bullets are the most common bodies shot into the injured parts; but the wound may be produced by cannon balls, pieces of broken shells, and very often on board of ship by splinters of wood. Large bodies of irregular figure, it is obvious, must occasion a greater quantity of mischief than such as are externally smooth, of a round form, and of moderate size. Pieces of clothes also are often carried along with the ball into the wound, as I shall hereafter more particularly notice.

But gunshot wounds, by what bodies soever produced, are always attended with contusion and laceration, by which, most commonly, some of the fibres, immediately surrounding the wound, are deadened, and must be thrown off, in the form of a slough, before the wound can heal. Hence, gunshot wounds rarely admit of being united by the adhesive inflammation, but must suppurate; and, on this same account, they seldom bleed profusely, except when very considerable blood vessels are wounded.

As Mr. Hunter has observed, however, some of these cases bleed much more than others, even though the same parts are injured. This, he says, arises from the manner in which the wound is produced. If the artery be cut directly across, and this be done by a ball that is passing with considerable velocity, the vessel will bleed rather freely; but if the artery be bruised, and in some degree torn, then it will bleed less; a case which is apt to occur when the ball is passing with diminished force and rapidity. *

Besides the figure and magnitude of the body impelled into the living solids, the velocity with which it moves makes considerable difference. This we are assured of by finding, that when a ball has passed with little velocity (which is often the case with balls at their entrance, but most commonly where

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* Hunter, op. cit. p. 526.

they are near their exit,) the wounds may often be healed by the first intention. At the entrance of the ball, the circumference is usually depressed; at its exit, prominent; and in numerous instances, the adjacent parts have a livid appearance. The opening, which the ball makes in entering a limb, is always smaller than that, by which it passes out again.

On account of the parts surrounding a gunshot wound being often deadened, the nature of the injury cannot always at first be comprehended. A part of some viscus, some large artery, or even a bone, may have been deadened by the violence; but the mischief does not manifest itself till the separation of the slough takes place. *

The detachment of the deadened parts is usually not accomplished till about the sixth, eighth, or tenth day, and sometimes not till the fifteenth day, after the receipt of the injury; consequently, at these periods, there is the greatest danger of hemorrhage, extravasations of the contents of viscera, &c. The knowledge of these circumstances naturally suggests the propriety of having the wound most narrowly watched, at the falling off of the eschars, " for the blood often bursts out in the night, and in the morning, the patient is found dead, bathed in his blood." †

When the ball moves with little velocity, there is always less sloughing than when it has penetrated with rapidity; for if the divided parts have not time to yield to the dividing body, they must of course suffer a vast deal more violence.

When the velocity of the ball is great, the direction of the wound is more likely to be straight. ‡

When a gunshot wound only injures soft parts of ordinary importance, it is termed *simple*. When at the same time it fractures a bone, wounds a large artery, nerve, or important viscus, it is then called *compound*.

The latter complications must greatly increase the danger of the accident, as any one may readily conceive, who knows the peril attending fractures, conjoined with a wound; the hazard of bleeding, or of mortification, when the main artery of a limb is injured; and the various consequences of wounds of the viscera, extravasations, &c.

With respect to the ordinary symptoms of a gunshot wound; the effects, as Mr. Hennen has observed, differ so materially in different men, and the appearances are so various, according to the nature of the part wounded, and the greater or lesser force with which it has been struck, that no train of symptoms can be described as invariably occurring. If a musket or pistol ball has struck a fleshy part, without injuring any material blood vessel, we see a hole about the size of (or smaller) than the bullet itself, with a discoloured lip, forced inwards; and if the ball has passed through the parts, an everted edge, and a more ragged or larger orifice at the point of its exit. The hemorrhage is generally very slight, and the pain often inconsiderable, insomuch that in many instances the wounded are not even conscious of having received any injury. If, however, the ball has touched a large vessel or nerve, the hemorrhage will be profuse, or the pain of the wound severe, and the power of the part lost. Some men will have a limb carried off, or shattered to pieces by a cannon ball, without exhibiting the slightest symptoms of mental or corporeal agitation; while a deadly paleness, instant vomiting, profuse perspiration, and universal tremor, will seize another on the receipt of a slight flesh wound.* The sudden yellowness, syncope, shiverings, and other nervous affections with which the wounded are sometimes seized, were circumstances which in former times materially confirmed all in the idea that there was something really deleterious in every gunshot wound. "What, indeed, (says Mr. John Bell) could more resemble the bite of a serpent, or some poisoned wound, than an instant affection of all the body, a trembling and unaccountable sinking within, yellowness of the face, paleness of the extremities, a failing of the pulse, and a livid wound from which no blood was discharged."† This sudden agitation and alarming indisposition, however, are far from being most common in injuries, not penetrating the greater cavities of the body, as I had many opportunities of being convinced of in the late campaigns in Holland and Belgium, where many a brave man was seen with a limb torn completely off, lying without any of the above described general perturbation of the system, and as quietly and composedly awaiting surgical assistance as if the accident had been only a very slight injury. The most dreadful gunshot wounds, in fact, sometimes happen, without bereaving the patient of his senses and presence of mind for a moment. A remarkable proof of the truth of this observation was seen in a young sailor, who presented himself a few years ago at St. Bartholomew's hospital. A cannon ball had struck him on the shoulder, and, besides severing the limb from the body, had broken away a large portion of the clavicle, and shivered the scapula into numerous fragments. Yet even on this severe occasion there was no syncope, no bleeding of consequence, and the poor fellow's senses were not suspended for an instant.

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* Hunter, op. cit. p. 524.

† John Bell, Discourses on the Nature and Cure of Wounds, p. 182. edit. 3.

‡ Hunter, op. cit. p. 527.

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* Hennen's Obs. on some Important Points in the Practice of Military Surgery, and in the Arrangement and Police of Hospitals, p. 31. 8vo. Edinb. 1818. A book well deserving the attention of the army surgeon.

† Discourses on Wounds, p. 170. edit. 3.

The form, the momentum, and the direction of the shot which is received; the position and the variety of structure, or, in other words, the variety of density, and powers of resistance, in the part receiving it; are the principal causes influencing the course of the ball, in its passage through the substance of the body. Every new resistance, which a shot in motion meets with, operates so as to produce, not only a diminution of its momentum, but, also, a change in its direction.

By adverting to the above circumstances, the strange course which some balls take, running nearly all round the body beneath the skin may be satisfactorily explained. Their track, when it is thus superficial, is generally indicated by what Mr. Hunter compares to a blush, or, as Mr. Hennen says, by a wheal or dusky line, terminated by a tumour, in which the ball is contained; and sometimes where this mark is absent, a certain emphysematous crackling shews the course of the bullet, and leads to its detection. Some very extraordinary instances of the reflection of balls, from one part of the body to another, are recorded by the preceding author. The ball (he observes) is in many instances found very close to its point of entrance, having nearly completed the circuit of the body. In one case, which occurred to a friend of his in the Mediterranean, the ball which struck about the pomum Adami was found lying in the very orifice of its entrance, having gone completely round the neck. This winding course of balls is represented as particularly frequent when they strike the ribs or abdominal muscles; for, says Mr. Hennen, they are turned from the direct line by a very slight resistance indeed, although they will sometimes run along a continued surface like that of a bone, a muscle, or a fascia, to a very extraordinary distance. If there is nothing to check its course, and its momentum be very great, it is surprizing what a variety of parts may be injured by a musket ball. Mr. Hennen affirms that he has seen cases where it has traversed almost the whole extent of the body and extremities. In one instance, which occurred in a soldier with his arm extended, in the act of climbing up a scaling ladder, a ball, which entered about the centre of the humerus, passed along it over the posterior part of the thorax, coursed along the abdominal muscles, passed deeply through the glutæi, and presented itself on the forepart of the middle of the opposite thigh. In another case a ball which had struck the breast lodged in the scrotum. *

It was formerly supposed that a ball might injure parts of the body in two ways, viz. by actually striking them, and by passing close to them, without touching them at all. This last kind of injury was called a wind-contusion, and supposed to originate from the violent commotion produced in the air by the rapidity of the ball. It consists of a forcible bruising, and even comminution, of the soft and hard parts situated beneath the skin, which itself remains entire.

The above mode of explaining how this violence is occasioned, is too absurd to need a serious refutation. The slight perturbation of the air is too feeble to account for the degree of violence committed. The air, to which the ball must impart the greatest motion, is that which is directly before it; and yet this does not do the smallest degree of violence to the parts surrounding the spot at which the ball enters. Cannon balls often strike limbs, without the neighbouring parts being in the least hurt. Our soldiers and seamen frequently have pieces of their hats, feathers, clothes, and even of their hair, shot away, without any other mischief whatever being produced. Nor is there more foundation for attributing the injury to electricity, produced by the violent friction of the ball in the bore of the gun, and said to be communicated to the injured part; for metals do not become electric from friction. These *wind-contusions*, as they have been improperly named, are now well known to be caused immediately by the ball itself. Its occasioning a violent contusion, without wounding the skin, or entering the limb, is to be ascribed to the sloping direction in which it first strikes the surface, and to its being reflected.

In some instances this kind of mischief may be caused by spent balls, which having lost nearly all the impetus originally imparted to them, operate chiefly by their weight. The injury occasioned by these gunshot contusions is often excessively severe, notwithstanding the skin may seem entire. The soft parts underneath are sometimes quite crushed and destroyed, the bones fractured, and that kind of stupor of the whole member occasioned, which inevitably ends in mortification.

Surgeons ought to feel themselves under great obligation to Ambrose Paré, for the more accurate opinions, which he first introduced, concerning these *wind-contusions*, as they were called. But no man has exposed the absurdity of supposing that life may be extinguished by the "whiff and wind of a ball" better than Mr. John Bell. "The reason of all these wonderful tales about the wind of a ball (says he) is itself very wonderful. Men often fall in the field of battle, and when the camp-followers come to turn over their bodies, in burying the dead, no wound nor mark of injury is seen; and often also men are laid in the military hospitals, dying and unable to speak, upon whom there is found no kind of wound, nor even the slightest bruise of the skin. Now this apparent difficulty will disappear, when I state (says Mr. John Bell) that a limb is often broken while the skin remains unhurt, and a dreadful fracture it is; for when a great bullet strikes fairly it knocks off the limb, but when it strikes obliquely it buffs along the skin, the ball is turned away, and the part struck becomes insensible at the instant; there is no feeling of the terrible accident that has happened; the patient is sensible of nothing more than a confused shock; hardly knows where he is struck, and falls down. This fracture is of the worst kind, for it is accompanied with such a bruising of the parts that they never can be restored; and though the skin is still entire, there is much blood extravasated, the muscles are in an instant reduced to a gelatinous and pulpy mass, &c. Let a ball hit any of the great cavities thus obliquely, and this phenomenon appears; the patient is killed without any external wound. He is killed, according to the notion of his fellow-soldiers, by the wind of some great ball. But we know that the ball has actually struck him, that the breast, the belly, or the head, has been hurt. If the chest has been struck, then the ribs have perhaps yielded, and escaped the blow, but the lungs have suffered, and there is often blood extravasated in the chest. In the belly there is often a bursting of the liver, or spleen, without any outward wound of the skin; very frequently in the head, though there appears no outward injury, the pericranium is separated from the skull, and there is an effusion of blood upon the brain." *

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* Hennen, op. cit. p. 55.

KINDS OF EXTRANEOUS BODIES LODGED IN GUNSHOT WOUNDS.

Extraneous bodies are more frequently met with in gunshot wounds than in any others. They are commonly of three sorts: 1. Pieces of clothes, or other substances, which the ball has driven into the limb: 2. the ball itself: 3. or lastly, loose, splintered portions of bone.

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* See John Bell's Discourses on the Nature and Cure of Wounds, p. 175—177. Also Larrey's Mém. de Chir. Militaire.

Such foreign bodies are the causes of many bad symptoms. They irritate the wounded parts so as to excite pain, inflammation, a disposition to hemorrhage, copious, and long-continued suppuration, &c., and the more uneven, pointed, and hard, they are, the more they are apt to create these unpleasant occurrences.

When there is only one opening, the surgeon has a right to conclude, that the ball is lodged; for I need scarcely lay down as exceptions to this observation, the very rare cases in which the ball, after making a deep wound, is found in the patient's shirt. In these instances, the foreign body carries a piece of shirt with it into the part, without going through the linen, and when the latter is inadvertently drawn out, the ball is also extracted. An officer who wore a silk handkerchief in his breast had several duplicatures of it actually carried into the pectoral muscle by the ball, which was afterwards drawn out with the handkerchief. *

When there are two apertures, we may infer, that the ball has passed out. However, pieces of the clothes may still be lodged in the wound; for, as they are lighter, and move with less impetus than the shot itself, they must be more likely to be left behind.

In Mr. Hennen's late publication several very curious instances may be read, in which the foreign bodies were either of enormous size, or of an uncommon kind. A spent twelve pound shot is there stated to have been found in the fleshy part of the thigh of an officer, who was killed at the siege of Seringapatam. † In another case, which happened in Belgium, a pantaloon pocket of coarse linen, containing two five-franc pieces and two small copper coins, was extracted from the substance of the vastus externus muscle. ‡ In one still more curious instance, two five-franc pieces, and a Dutch stiver, closely beaten together, were extracted from the thigh of a soldier, who had no money about him previously to the injury, and who accounted for the situation of these coins by supposing that they had been carried from the pocket of his comrade, who stood before him in the ranks, and who had been killed by the same shot. § A case is also detailed, in which several fragments of the bones of a cranium were taken from a lacerated wound of the thigh; and others, in which pieces of different bones, and even teeth, not belonging to the patients themselves, were found imbedded in their flesh.

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* Hennen's Military Surgery, p. 35.

† P. 83.

‡ P. 87.

§ P. 88.

TREATMENT OF GUNSHOT WOUNDS.

The first thing in the treatment of a gunshot wound in one of the extremities, is to determine, whether it is more advisable to amputate the wounded limb immediately, or to undertake the cure of the injury.

When a bone, especially at a joint, is shattered into numerous fragments; when the soft parts are, at the same time, extensively contused and lacerated, with injury of important blood vessels and nerves; and when at the same time the whole limb is thrown into a cold and insensible condition by the violence of the shock; no resource is so safe as amputation; and delay, under such circumstances, would lead to almost certain death.

Larrey says, when a body is projected from a cannon, and strikes a limb, so that the bones are fractured, and the soft parts violently contused, extensively torn and comminuted, amputation should be instantly performed. He recommends the same practice, when a large portion of the soft parts and the principal vessels of a limb, are carried away by a ball, and the bone fractured. He represents the operation as equally indispensable when a large ball strikes the thick part of a limb, breaks the bone, cuts and tears the muscles, destroys the great nerves, and yet leaves the principal artery entire. When a spent or rebounding ball has struck a limb obliquely, without causing a solution of continuity in the skin, while the bones, muscles, tendons, aponeuroses, are torn, broken, and crushed, Larrey thinks the following conduct proper: the extent of the injury must be ascertained, and if the bones be fractured under the soft parts, and there be ground to suspect that the great vessels are lacerated, amputation should be performed. But if the vessels and bones have been spared, and the muscles alone have been totally disorganised, he is content with the practice recommended in the Memoirs of the French Academy of Surgery, viz. that of making an incision, and letting out the thick black extravasated blood. Larrey then instances fractures of the articular heads of the bones of the knee and ankle by gunshot, and the extensive denudation of a large portion of bone by a ball which has passed through the limb, as demanding immediate amputation. The latter case, however, is not quite so clear, for much must depend on the situation and quantity of injury inflicted. Perhaps the opinion given by another surgeon on this particular accident is more correct, namely, that where the ball is no larger than one projected from a musket, it is more advisable to wait and be governed by consequences.[*] I entirely differ, however, from the American surgeon who infers from one example, in which a patient recovered with a stiff-joint, after being shot through the knee with a musket-ball, and from a few other rare escapes, that Larrey was wrong in pointing out such injuries as decided examples demanding immediate amputation. On the contrary, all the gunshot injuries which I noticed abroad, that had been caused by the passage of balls through the knee-joint, fully confirmed the propriety of the general rule of amputating the limb thus injured. With respect to cut wounds, of large joints, I allow with Mr. Mann that they are not always cases positively demanding the immediate performance of the operation.

But below some of these violent degrees of injury, in which the necessity of immediate amputation can be readily and positively settled, there are several inferior degrees in which the soundest judgment is required to form a prudent determination. In many of these cases, the scale is so delicately balanced, that an opinion is not to be formed from a consideration of the injury alone. In dubious cases, the patient's constitution; the possibility or impossibility of procuring good accommodation, rest, attendance, and pure air, are matters which ought to have weight.

Bilguer, surgeon-general to the armies of Frederick the Great, King of Prussia, published an essay, in which the practice of amputation was condemned as an operation hardly ever proper.[‡] The arguments, broached in this extraordinary production, however great their influence might once be, as coming from so high an authority, can no longer misguide any practitioner of common sense. In France, the absurdities of Bilguer's work were long ago ably exposed by La Martinière[§]; and in England by Mr. Pott[||]: while more recently some judicious criticisms on his statements were drawn up and published by Mr. Guthrie[¶], a gentleman whose evidence is valuable, as being founded upon the great opportunities of observation and comparison of which he availed himself during the war in the Peninsula. Nothing is now better known and established than that, in many cases of bad gunshot injuries of the limbs, the patient's only chance of preservation depends upon the performance of amputation.

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[*] Mann's Medical Sketches of the Campaigns of 1812, 1813, 1814, &c. p. 210. 8vo. Dedham, 1816.

[‡] De Membrorum Amputatione rarissimè administrandâ, aut quasi abrogandâ.

[§] Mém. de l'Acad. de Chir. tom. iv.

[||] Remarks on the Necessity, &c. of Amputation in certain Cases. Pott's Works, vol. iii.

[¶] On Gunshot Wounds of the Extremities, requiring the different Operations of Amputation, with their After-treatment, establishing the Advantages of Amputation on the Field of Battle to the Delay usually recommended, p. 7, &c. 8vo. Lond. 1815.

Another question, that was not quite so well settled a few years ago as it is now, is at what time amputation should be done in cases of gunshot wounds, where such operation is allowed to be indispensable. In 1756, the French Academy of Surgery conferred its approbation on a memoir written by M. Faure, who was an advocate for delaying the operation until the first bad symptoms were at an end. Mr. Hunter was in favour of the same practice. Upon the whole, however, reason, experience, and authority are strongly against delay. The immediate performance of the operation is urged by La Martinière, Le Dran, Ranby, Kirkland, Larrey, Guthrie, Hennen, Thomson *, &c. Larrey's valuable works contain the most decisive facts in support of this practice; facts, drawn from extensive experience and a comparative trial of both methods †, while nothing can be more unequivocal and convincing, than the important cases and observations to be found in the practical writings of the other authors, to whom I have referred.

It is a doctrine, frequently inculcated in the schools, that a man, who has been long habituated to disease, is more likely to bear an operation well, than another man, who is suddenly necessitated to part with his limb for an accidental injury, while he remains, in other respects, perfectly healthy. The perturbation into which the system is thrown, by the sudden occurrence of an alarming local injury, has also been urged as a reason against immediate amputation.

It would be quite unnecessary for me to assert, that there is no truth in such opinions, in relation to some of the operations, which are performed in civil hospitals. What I saw during my apprenticeship, at St. Bartholomew's, left me with an impression, that amputations done immediately after accidental injuries were generally less successful, than similar operations done for the removal of white swellings, and other chronic diseases. But, then, this has nothing to do with the

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* Report of Observations made in the Military Hospitals in Belgium, with some Remarks upon Amputation. 8vo. Edinb. 1816.

† See Relation Historique et Chirurgicale de l'Expédition de l'Armée d'Orient, en Egypte et en Syria. Par D. J. Larrey. Paris, 1803; and Mém. de Chirurgie Militaire, 4 tomes. 8vo. Paris, 1812—1817.

question before us; for it does not prove any thing at all, with respect to the advantages or disadvantages of immediate amputation in bad accidental injuries, but; merely, that the amputation of a diseased joint generally terminates better, than that of a shattered limb. We have still to enquire, whether, if the amputation had been delayed in such cases of badly shattered limbs, where confessedly there was no hope of saving them in the end, the operation would have had more extensive success. The question would then be more to the point; because gunshot wounds rank as accidents. Now, as far as we can believe the testimony of the most experienced writers, especially that of Mr. Pott, we are bound to conclude, that the operation should be done, in every case of this kind, without the least delay. And, with respect to such gunshot injuries of the limbs, as are decidedly fit cases for amputation, because no rational chance of saving the part can be entertained, Larrey, Guthrie, Hennen, Hutchison *, and all the latest and most experienced authors on military surgery, unanimously agree about the necessity either of the immediate, or very early performance of the operation. They further agree about the dangers of delay, and the infinitely greater number of recoveries following the speedy use of the knife. † Respecting some little difference of sentiment on the point, viz. whether we should wait till the patient has revived a little

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* Some Practical Observations in Surgery, 8vo. London, 1816.

† From some statements, made by the hospital surgeon to the American armies, we might infer that consecutive amputations are more successful than primitive. See James Mann's Medical Sketches of the Campaigns (in America) in 1812, 1813, and 1814, to which are added Surgical Cases; Observations on Military Hospitals; and Flying Hospitals attached to a moving Army, &c. 8vo. Dedham, 1816. "Although (he observes) there are cases, which require immediate amputation on the field of battle, and without which life cannot be saved, yet, we have to observe, that, after the battles of Little York and Fort George, a less number survived primitive than consecutive amputation." P. 213. No conclusion, however, can be drawn from such a cursory remark, unsupported by the particulars of the cases in question. Some of the men who suffered immediate amputation might have died of hemorrhage after the operation, as the three or four probably did, who "died immediately after the amputation had been performed on battle-ground;" and then the fault might have been not in the operation itself, but the performers of it, who did not effectually secure the vessels. Such patients might have been dying, from causes unexplained, before the operations were begun; or they might have been so much depressed by the shock of the accident, as to have been improper subjects for the operation, until their powers of life had risen a little, of which we may find instances in Mr. Guthrie's publication. The more any observation differs from the result of the united experience of a great many able and disinterested men, the more necessary it becomes to have the details in its support.

from the first effects of the injury, or, (as the expression is,) whether the knife ought to follow the shot as speedily as possible, I believe this is rather a seeming than a real difference. No man would amputate while a man is lying in a state of depression and syncope, perhaps, with hardly any pulse, warmth, or animation. Here we must all coincide with Mr. Guthrie, that it is better to wait a little, and that to let the knife follow the shot would probably destroy the patient upon the operating table. But, should the patient not be thus dangerously depressed, then neither Mr. Guthrie nor any other army surgeon, would think of proposing delay. With this understanding, therefore, I conceive the following passage to be judicious and correct: " If (says Mr. Guthrie) a soldier, at the end of two, four, or six hours, after the injury, has recovered from the general constitutional alarm occasioned by the blow, his pulse becomes regular and good, his stomach easy, he is less agitated, his countenance revives, and he begins to feel pain, stiffness, and uneasiness in the part; he will now undergo the operation with the greatest advantage, and, if he bears it well, of which there will be but little doubt, *he will recover in the proportion of nine cases out of ten in any operation on the upper extremity, or below the middle of the thigh*, without any of the bad consequences usually mentioned by authors as following such amputations." * For all those injuries, in which amputation must absolutely be done, in order to give the patient the best chances, the practical and common maxim with army surgeons is, as Mr. Hennen observes, to proceed to the operaton with as little delay as possible. While hundreds are waiting for the decision of the surgeon, he will never be at a loss to select individuals, who can safely and advantageously bear to be operated on, as quickly as himself and his assistants can offer their aid: but he will betray a miserable want of science, indeed, if, in this crowd of sufferers, he indiscriminately amputates the weak, the terrified, the sinking, and the determined. While he is giving his aid to a few of the latter class, encouragement and a cordial will soon make a change in the state of the weakly, or the terrified. †

In all sudden accidental injuries of the limbs, from great external violence, as gunshot wounds of the extremities truly are, there are generally only two periods, at which amputation can be performed with much prospect of success. The first is immediately after the occurrence of the injury, before inflammation arises, and before a disposition to gangrene commences in the limb. This period only lasts a few hours; and, when these have elapsed, the dangers of mortification and death must be faced. With regard to amputating when the limb is universally swollen, and in a state approaching to gangrene, however favourably we may be disposed to think of the practice under circumstances noticed in the chapter on mortification, and when an earlier and better opportunity has been lost, we cannot compare the chances of recovery then to those which might have been obtained by an earlier operation. On the contrary, in this late stage of the case, when things have fallen into so deplorable a condition, the patient's state is desperate, whether amputation be done, or not.

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* On Gunshot Wounds of the Extremities, p. 24.

† Obs. on several important Points in Military Surgery, p. 49.

If, however, these immediate perils should be got over, and the wound be brought into a state of suppuration, the violent inflammation and swelling abate, and, while the patient's strength yet remains adequate, the opportunity of amputating is once more afforded. But if the state of the patient is now not more favourable for an operation than it was directly, or soon after the accident, what has he gained but a great deal of avoidable pain and suffering? The necessity of the operation was acknowledged; its general success, when done early, is sufficiently proved; the second opportunity of doing it is frequently lost for ever by the patient's intervening death; and, if it should come, it brings not with it the same promise of recovery as the first did.

There are further reasons for preferring amputation to an attempt to preserve limbs, which have been severely shattered by gunshot wounds.

1. By means of the operation, the patient gets rid of a dreadful contused wound, which threatens the greatest peril to his very existence, and exchanges it for a simple incised wound.

2. The pain of the operation is not, upon the whole, a greater severity, than the aggregate pain arising from the inflammation, irritation of extraneous bodies, and incisions for their evacuation and that of matter, in cases in which an effort is made to preserve the limb.

3. The loss of the limb ought not to be taken into the scale; for, the surgeon only amputates on the principle of saving the patient's life by that privation. When life is at stake, and it is more likely to be saved by the operation, than both life and the limb together without the operation, it is our duty to amputate. By this maxim, no doubt, a small proportion of limbs, which might be preserved, will be sacrificed,

but the patient's life will be more frequently saved. Limbs, which are saved after such dreadful injuries, are also very often not more useful than a wooden leg; and the vigour of the constitution is oftentimes irrecoverably lost for a limb, which is rather a burden than a convenience.

Perhaps, in the army, surgeons may sometimes be justified in amputating limbs, which it might be proper to endeavour to save, under all the advantages and conveniences of private practice. The necessity for the operation must evidently be greatly increased, when circumstances demand the patient's speedy removal from the field of battle to an hospital at a distance. The difficulty of conveyance; the bad accommodation in the military waggons, into which the wounded are crowded; the painful jolting, to which they are there subjected; and the way in which they are exposed to the inclemency of the weather; are all weighty reasons in favour of taking off the shattered limb. When the bones are broken and splintered, the sharp spiculæ are forced by the motion of the carriage still further into the flesh, and thus cause infinite suffering and vast additional mischief. Frequently, when the operation is put off, the disturbance of the parts in the journey so bruises and lacerates them, that the patient perishes in the most cruel agony, before he arrives at the hospital, which is intended for his reception.

As Larrey observes, the dangers of a long residence in an hospital are also much diminished by amputation, which converts a gunshot wound into one which is capable of being speedily healed, and obviates the causes that produce hospital fever and gangrene. In case the wounded should be left on the field of battle, it is then important that amputation has been performed, because, when it is completed, they may remain several days without being dressed, and the dressings can afterwards be changed with greater facility.

When the upper part of the os humeri is fractured, by a musket ball, the necessity for amputating the limb may frequently be obviated by making an incision down the centre of the deltoid muscle, and extracting the splintered head of the bone. The facts recorded by Boucher*, Thomas, Vigaroux †, and Mr. C. White ‡, of Manchester, first exemplified the possibility of saving the whole arm by the excision of the upper portion of a diseased or shattered humerus; and the propriety of a similar proceeding in some gunshot fractures of the upper part of that bone, has been well proved in the practice of M. Larrey. In the single Egyptian campaign, this last judicious surgeon superseded all occasion for amputating the limb, in no less than ten instances, by extracting without delay the head of the humerus and the fragments of bone, and in his subsequent campaigns he has verified the propriety of the practice in a much larger number of examples. After the operation the humerus is to be kept up to the shoulder with a sling and a bandage. In one most remarkable and successful instance, the scapulary end of the clavicle, the acromion, and the head of the humerus, were so broken to pieces, by the ball of a four-pounder, that the removal of all these parts was unavoidable. In some cases, an artificial joint is formed; in others, an anchylosis follows.* The American army surgeon, Mr. Mann, assures us, also, that in several dreadfully lacerated wounds of the shoulder, he saw the patients recover without amputation, care being taken to remove the splinters of bone.

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* Mém. de l'Acad. Royale de Chirurgie, t. v. p. 302, &c.

† Œuvres de Chirurgie Pratique, par J. M. Vigaroux. Montpellier, 1812.

‡ Cases in Surgery, p. 57.

In one case, the superincumbent muscles of the shoulder, with part of the subjacent, were destroyed, leaving a small portion in the axilla, connected with the principal artery, which received no injury. The acromion process and clavicle were fractured. The head of the humerus was broken, and four inches of the bone forced away by the ball, leaving an inch of its extreme head in the socket. Mr. Mann deemed amputation necessary to save the wounded officer's life; but the proposal was rejected. The fractured pieces of bones were removed, and by careful attention to the wound the arm was saved, so as to be of some use. Two other very interesting cases of a similar kind are also recorded, in which many splinters were extracted, pieces of the humerus sawn off, and some of the deadened portions of muscle cut away. The successful termination of these cases induces Mr. Mann to assert, that such will be the general result when the patient's health is good; and that the limb can be saved, with the small deformity of too sudden a sloping of the shoulder.† In a severe injury of the head and neck of the humerus, Mr. Guthrie thinks, that if the splintering extends to the body of the bone, amputation should be performed; if it be confined to the head and neck of the humerus, excision may be practised.* One would suppose, it must generally be better practice, rather to be content with making a free incision through the deltoid, and extracting all the loose splinters of bone, than attempt the formal excision, or sawing off of the whole upper part of it; a proceeding, which Mr. Guthrie† adduces cases to prove is not always necessary, even where the head of the bone is much shattered.

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* Relation Historique et Chirurgicale de l'Armée d'Orient en Egypte et Syria, p. 515.; and Mém. de Chirurgie Militaire.

† Medical Sketches of the Campaigns of 1812, 1813, and 1814, &c. p. 208, 209.

THE DILATATION OF GUNSHOT WOUNDS BY INCISIONS, AND THE EXTRACTION OF FOREIGN BODIES, CONSIDERED.

When amputation was not deemed necessary, the old surgeons used, according to the customary precepts, to enlarge the aperture of the wound by an incision. Numerous advantages were alleged to result from such a dilatation. It was said to facilitate the extraction of foreign bodies, to occasion a beneficial effusion of blood, and to promote the escape of fluids extravasated in the surrounding cellular substance. Dilating the wound by an incision, was also absurdly supposed to convert the fistulous track of a ball into an open incised wound, and, thereby, render its nature more benign, while another good effect, supposed to result from dilating a gunshot wound, was the division of unyielding parts, which confined, and thus aggravated the internal swelling.‡

More modern experience has clearly evinced, that the utility of these incisions has been overrated The knowledge, that gunshot wounds are of very various descriptions, ought at once to condemn the unlimited plan of dilating all of them. When the course of the ball lies in soft parts, and has neither touched a bone, nor a considerable blood vessel, whether the wound have one or two openings, the scheme of dilating it is productive of no good. In gunshot wounds, the aperture in the skin is larger than in punctured ones and stabs; for, in the former, there is a real loss of substance in the skin, the part of which, first struck by the ball, is generally driven into the wound. By the separation of the sloughs, the canal of the wound becomes still more dilated, so that not only matter, but foreign bodies, may find an easy exit. Incisions also usually soon close again, and the wound becomes, in a few days, in the same condition as if no dilatation had been made.

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* On Gunshot Wounds of the Extremities, p. 248. I remember seeing an artilleryman, at Merxam, near Antwerp, the greater part of whose shoulder was carried away by a 24 pound shot, and all the adjacent parts so broken and lacerated, that the lungs and pericardium were visible. The man, however, recovered without amputation. This case, was also seen by Mr. Curtis, surgeon of the 1st guards, and by Dr. Halliday, gentlemen then on duty with myself. The latter has given some account of it in the Edinb. Med. and Surg. Journ. vol. xi. p. 140.

† P. 330, &c.

‡ This doctrine appears to me to be somewhat too much enforced in the writings of Mr. John Bell, M. Larrey, and Mr. Hennen.

Gunshot wounds are only to be dilated, when there is some plain and beneficial object to be accomplished by it.

No doubt, it is right to extract, at first, as many foreign bodies as possible; for, while they continue in the wound, they always exasperate the inflammatory symptoms, and sometimes create agitation of the whole nervous system. By an early extraction of them, profuse suppuration may often be prevented. Yet, let it be remembered, that the search for foreign bodies is frequently attended with great irritation of the wound; and that in numerous instances it is impossible to find and extract them immediately, as, for instance, when they lie deep, and fast in the parts. When the wound becomes widened by the separation of sloughs, the foreign bodies generally grow loose, and, on both accounts, their extraction can then be more easily practised. After having been deeply lodged, they sometimes spontaneously approach the surface, on the occurrence of suppuration. Lastly, it is to be observed, that foreign bodies, of smooth figure, have often been found to lie, without the least inconvenience, in parts from which they could not possibly be extracted.

Hence, the surgeon acts wisely, who seeks at first to extract only such foreign bodies as are near the external opening, and are loose, and removable without much irritation. When, however, they make pressure on an important part, a large artery, a considerable nerve, or important viscus, so as to create violent and dangerous symptoms from this cause, an incision is warrantable to remove them, even when deeply lodged. If a large artery bleeds, it is to be exposed and tied, as in other wounds. Sometimes when there is reason to expect a fracture of the skull, an incision may be judiciously made to examine the bone; that is to say, if there are symptoms leading to a suspicion, that a part of the bone is depressed, and makes dangerous pressure on the brain. In this circumstance, it would not only be advisable to examine the state of the cranium, under the scalp, but even to remove such parts of the bone as are either splintered, or beaten inward. Depressed portions of the sternum and ribs may require incisions, just as the same injuries of the cranium. *

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* See Hunter on the Blood, Inflammation and Gunshot Wounds, p. 535, &c.

When the ball lodges in any of the large cavities, incisions are usually improper, because it is impossible to trace the foreign body, and, therefore, they answer no direct purpose. When the ball enters far into the substance of a bone, a dilatation of the wound would also be of no utility.

But all that I have said upon this head is insufficient to guide the surgeon in every case. If the dilatation of the wound, for the purpose of extracting foreign bodies, should be less likely to aggravate the inflammation than the presence of those bodies, then it is highly judicious to put it in practice.

In every case, in which the ball cannot easily be discovered, one may safely decide to abandon all painful and irritating examinations. Experience shews, that its lodgment often creates no trouble, nor bad symptoms. Lead also has been observed to irritate less than any kind of extraneous * body. Sometimes, however, the ball may be so easily got at, that it ought undoubtedly to be extracted. In some instances, the ball remains on the side of the limb opposite to its entrance, beneath the integuments. If the skin, under which the ball is lodged, be contused in such a way, that it will probably slough, it is to be considered as a lifeless part, and an opening is to be made into it for the extraction of the ball. But, when the ball lies so far from the skin that one can only just feel it, and the skin itself remains uninjured, Mr. Hunter disapproves of making a counter-opening. His experience taught him, that the wound healed much better when the ball was left alone, and that the chief inflammation was not in the vicinity of the foreign body, but about the mouth of the wound. In cases, in which a counter-opening had been made, Mr. Hunter noticed, that the same inflammation sometimes attacked it, which took place at the entrance of the ball. However, notwithstanding this high authority, I had many opportunities of seeing, while I was abroad, that the rule here inculcated was not followed. On the contrary, army surgeons of the present day always make it a maxim to extract the ball as soon as possible, when situated as above described. " The ball (says a late writer) will frequently have passed nearly through the limb, and be retained only by the elasticity of the common integuments. There we cut upon and extract it at once;" and he then enjoins extracting on the spot every extraneous body that we possibly can, either with the forceps alone, or the aid

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* Vide Encyclopédie Méthodique, Partie Chirurgicale. tom. ii. p. 188.

of the bistoury.* On the whole, I believe, it must be admitted, that Mr. Hunter was on this point rather too timid and theoretical; though, perhaps, modern military surgeons may rather run into the opposite extreme, and put their patients to more pain in their attempts to get out the ball, than may be right and prudent.

Such instruments as screws, gimblets, and bullet-drawers, ought seldom to be used in extracting bullets. The fingers are commonly the most proper instruments; and, when forceps are judged more convenient, they should not be of a large clumsy construction.

Although one might judiciously omit an incision to extract a smooth round body, like a leaden bullet, one might not always act with equal judgment in doing so, when the extraneous body is of an angular figure, and large size, so as to be likely to cause immense irritation.

Detached splinters of bone are very irritating extraneous bodies; and when their extraction can be accomplished, consistently with the above principles, it ought never to be neglected.

In gunshot wounds, ligamentous bands sometimes appear to compress the tumefied parts beneath. But it is only when they unequivocally do so, or when they confine matter, that the knife should be employed to divide them.

DRESSINGS FOR GUNSHOT WOUNDS, AND CONSTITUTIONAL TREATMENT.

The best general dressings for gunshot injuries, and the absurdity of several of the former modes of treatment, were accidental discoveries, if we can use that expression, when the genius of a Paré was concerned in making them. "I had heard of nothing (says he) so often as of the poisoned nature of gunshot wounds, and had read both in De Vigo and in Guy de Chauliac of burning them with burning oils. When the French armies made their way into Piedmont, many of our soldiers were wounded in the smaller garrisons; and I saw the army surgeons using their terrible cauteries, and I also followed the common practice, and dressed the wounded with boiling oils, until all my oils were expended. On the night, when this happened, I dressed my wounded soldiers with oil of roses, and turpentine with whites of eggs. I went to bed much oppressed, with the apprehension, that all these poor fellows would be found in the morning poisoned and dead. I arose therefore betimes, and learnt to my infinite surprise and pleasure, that they had slept well and easy; without any pain, or swelling, or redness about the wounds, while those of my soldiers, who had been cauterized with hot oils, had great fever, and swelling, and excruciating pain." This fortunate accident made Paré afterwards invariably prefer the milder dressings; a wise resolution, to which he probably owed all his future success.

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* Hennen's Obs. on some important Points in Military Surgery, p. 32.

From the degree of contusion, laceration, and sloughing, produced in almost all gunshot wounds, no hope of union by the first intention can be entertained. Supposing the degree of injury is not such as to demand the immediate performance of amputation, and yet the bones are fractured, and the limb otherwise considerably hurt, the surgeon is first called upon to extract whatever splinters of bone and foreign bodies admit of being taken away, without too much pain and irritation. Should any violent hemorrhage exist, which is not a frequent event in these cases, the bleeding vessel must be secured without delay. The limb is then to be laid on a splint, that has upon it a thick pad, and an eighteen-tailed bandage. The wound is to be dressed with dry lint, or what is always preferable, a pledget of common cerate. I think adhesive plaster, which is sometimes recommended as a first dressing for gunshot wounds, never answers so well as common lint, or pledgets of any simple emollient ointment.

The tails of the bandage are to be methodically laid down over each other, and these, with some folds of linen, which are to be placed along the limb, may be wet with the liquor plumbi acetatis dilutus, or, what is equally good, simple cold water. The practice of keeping the wounded limb, or part, thus enveloped in linen wet with cold lotions, or common water, cannot be too highly commended, as an excellent plan for the first day or two, and one that can always be pursued with ease under any of the circumstances and difficulties which occur in the military service. Even were the wounded simply to have their injuries covered at first with loose wet linen, instead of tight bandages, I believe we should see fewer cases of mortification than actually occur. The wound having been dressed, such other pads and splints, as may be requisite, are then to be put on the member, and secured with straps and tapes. Lastly, the limb is to be put in the most eligible posture, and be kept as quiet as possible.

If the patient be young and strong, and should not have lost much blood, he is to be immediately bled, unless the system appears temporarily depressed by the shock of the accident, in which circumstance the surgeon should rather administer cordials, wine, and tonic medicines. In cases of gunshot wounds, the continental surgeons of the present day highly commend the practice of exhibiting an emetic, before the access of the inflammatory symptoms, and gentle evacuants during the suppuration. As soldiers are usually accustomed to every kind of privation and excess, their stomachs and bowels are seldom in a proper state, and, therefore, the preceding evacuations are said to be the more necessary. Besides occasional bleedings, according to circumstances, the application of leeches to the neighbourhood of the wound, is extremely beneficial, during the inflammatory stage; and, indeed, so are all the means advised for the relief of inflammation.

In the course of the first 24 hours, the swelling of the part and the inflammatory fever come on. In the case of a fracture, it will generally be best to persist in the employment of cold lotions, because the linen and bandages can be wet with them without taking off the splints, and disturbing the limb, as must be done if poultices be employed. When, however, suppuration begins, the pledgets and first dressings must be removed; and then the surgeon, if he prefer the method, may have recourse to emollient poultices, though they are always inconvenient applications under splints. In all other cases, they are undoubtedly the best local remedies, after the first day or two, during which cold lotions may be used with great advantage. Saline and aperient draughts are to be administered, and if the pain is excessively severe, opium. Should mortification follow, notwithstanding every effort to counteract it, the surgeon is to take the proper opportunity of amputating, and not wait, as was formerly advised, until an inflammatory reddish circle indicates the commencement of a separation of the living from the dead parts.

If the inflammation terminates in suppuration, the quantity of matter is, in some measure, proportioned to the contusion and other mischief; and, when the case prospers, the inflammatory symptoms abate, the eschars are thrown off, the quantity of matter gradually diminishes, the cavity of the abscess is filled up with healthy granulations, the broken bones unite, and the patient at last gets quite well.

Unfortunately, in many cases, things do not go on in this desirable way. The pus does not become less copious, and it assumes a sanious, thin, fetid quality. The greatness of the discharge brings on weakness and hectic symptoms, and the patient falls into a dangerous state. Here the nicest judgment is often required in deciding, whether the attempt to save the limb should be continued, or amputation be done without delay.

In the suppurative stage of gunshot wounds, the same internal medicines and diet, and the same external applications, are indicated, which I have specified in the chapters on suppuration and ulcers.

In cases of gunshot wounds, then, the dressings are to be superficial, and of the mildest description possible; at first some lint and a pledget of white cerate, with cold applications, and afterwards emollient poultices and fomentations are generally the best things to which we can have recourse. What good can introducing lint into the orifice of a gunshot wound produce? Is this practice designed to prevent its closure? If it is, the idea is absurd, as gunshot wounds are not very apt to unite by the adhesive inflammation. Fomenting the part, two or three times a day, with a decoction of white poppies, certainly deserves recommendation; for it always diminishes pain, and, consequently, must have a good effect on the inflammation. The consolidation of a gunshot wound is the work of nature. The steps, which she takes to effect it, have been noticed in treating of granulations. A suppurated gunshot wound is only an abscess, in which there are frequently extraneous bodies. To maintain a ready exit for the pus, and to remove all extraneous matter, which may be loose, and sufficiently near the surface of the body, is all that the surgeon can usefully do.

OF WHAT IS TO BE DONE WHEN A CANNON BALL HAS TORN OFF A LIMB.

In this case, all the best army surgeons of the present time advise the amputation of the stump, in order to procure for the patient an even, smooth incision, instead of an irregular, jagged, and highly dangerous wound. Even Mr. Mann *, hospital-surgeon of the American army, and by no means a zealous advocate for immediate amputation in many cases now considered as urgently requiring such a proceeding, accedes to the proposition, that, when a limb is carried away by a ball, or by the bursting of a grenade or a bomb, the most prompt amputation is necessary, and that the least delay endangers the life of the wounded. As the limb has sometimes endured a violent concussion, and is almost senseless and motionless, the

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* Medical Sketches of the Campaigns of 1812, 1813, 1814, &c. p. 207, 8vo. Dedham, 1816.

bone being at the same time often split upward, some even deem it invariably necessary to perform amputation, if possible, above the nearest joint.

There were some years ago a class of what one might name unpractical writers, who condemned the operation, in this instance, on the ground, that such wounds were disposed to end favourably without amputation, and that the state of the system did not admit of the operation being done with the best prospect of success.

But, since, when the operation is not done, an irregular wound of this description requires considerable incisions for the extraction of foreign bodies, for the discharge of matter, and for the purpose of shortening the projecting muscles and tendons, these objections to amputation are not extremely weighty. Such incisions would produce as much, and even more, irritation than amputation, without the production of equal good. In cases of this nature, therefore, the practice of immediate amputation is sanctioned by the unanimous approbation of the best informed surgeons of the army; and, if a few cases can be cited, in which patients with shattered stumps have survived, with the parts firmly healed, a much larger number has occurred, in which this reluctance to operate has had the most fatal consequences. The circumstance of such wounds having been occasionally cured without amputation evinces nothing more than that, in a few instances, it is not impossible to cure them without the operation.* The surgeon may here the more readily make up his mind to amputate, as the loss of a limb is not in question.

With respect to amputating above the nearest joint, this must depend on the distance of the injury from the articulation; no one would think of amputating above the knee, when the accident is situated near the ankle.†

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* About five years ago, Mr. Weir, the late Director-General of the army medical department, pointed out to me a soldier in the York hospital, who, from the appearance of his stump, had had his arm as well taken off by a cannon-ball as it could have been by the knife.

† With respect to poisoned wounds, and tetanus, I have given so full an account of these subjects in the last edition of the Surgical Dictionary, that I have decided to omit them in the present work, more especially, as the new matter, which I have to introduce upon other topics, calls for all the room which can possibly be spared in a book of this nature.

CHAP. XX.

CONTUSIONS.

A CONTUSION is an injury occasioned by the impulse of a blunt instrument against any part of the body, the skin remaining unlacerated.

The consequences of such violence are, a diminution of the tone of the injured fibres, and a rupture of an infinite number of small vessels. The bruised muscles are weakened, and cannot be exerted without pain; and the extravasation of blood causes swelling, and a black and blue discolouration of the skin, called by surgeons an ecchymosis. Sometimes vessels of considerable size are ruptured by the force, and very copious accumulations of effused blood are the result. In contusions of the head, we often see the scalp enormously elevated by hemorrhage beneath it, and large collections of blood are frequently found extravasated in the cellular substance of almost every situation in the body.

Violent contusions not only affect parts, on which the force immediately falls, they extend even to such as are remote from the place which was struck. The second sort of contusion is what the French have termed a *contre-coup*, in which the injury is to be imputed to the effect of a forcible concussion.

The mischievous effects of a contusion are not always proportioned to the force applied; they often depend on the nature of the injured part. If the bruise take place on a bone, which is thinly covered with soft parts, the latter always suffer very severely in consequence of being wounded, at the time of the accident, between two hard bodies. Hence, bruises of the shin so frequently cause sloughing and troublesome sores.

TREATMENT.

Slight contusions may be considered as occasioning only a weakness of the bruised vessels, and a degree of extravasation in the part. Any common liniment, or corroborant, astringent application, suffices for these accidents. The injured parts may be rubbed once or twice a day, with the linim. saponis comp., or may have linen moistened with vinegar, cold water, brandy, lime-water, solutions of alum, or of acetite of lead applied to them. The patient's bowels should also be opened with a dose or two of salts. When muscles are bruised, they ought to be relaxed and kept perfectly quiet. Nothing is more conducive than quietude to the restoration of their proper tone. Rest, one of the above-mentioned topical remedies, and a dose of any mild purgative salt, generally complete the cure of ordinary bruises.

When the contusion, however, is of a more violent description, and the quantity of extravasation is considerable, bleeding, and other evacuations, together with the use of leeches, are proper. The topical applications should be such as are mildly stimulating, and, consequently, such as are adapted to excite the action of the absorbents. Muriate of ammonia, dissolved in equal parts of vinegar and water, or the aq. ammon. acet. forms an excellent lotion. When the inflammation has subsided a little, liniments containing camphor may be used.

In cases, in which there is no danger of serious inflammation, and the chief indication is to promote the absorption of extravasated fluid, bandages act very beneficially, by the remarkable power which they have, of exciting the action of the lymphatics. It is best, however, not to employ them too early.

It is surprising, what large collections of blood will sometimes take place about the shoulder, and under the scalp, in consequence of bruises. Many surgeons would be induced to puncture such swellings, and let out the extravasated fluid.

Without condemning every instance of this practice, I have no hesitation in pronouncing it to be in general wrong and hurtful. In ordinary cases, under the use of discutient lotions, and the employment of aperient medicines, the blood is absorbed with incredible quickness. But, when an opening is made, the admission of the air to such blood as cannot be pressed out, makes this fluid putrefy; febrile symptoms arise; the part is often attacked with an erysipelatous redness; and extensive abscesses, sloughing, and death have been the too frequent consequences. *

Should the distention, however, threaten to bring on sloughing, every one must coincide in the propriety of discharging the blood by an incision. Cases of this kind are, by no means, very frequent. I have seen many instances, in which the whole scalp was prodigiously raised and distended by blood,

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* Several cases, illustrative of the evils arising from an external opening, are detailed by Pelletan, in his Clinique Chirurgicale, tom. ii. Mém. sur les Epanchemens de Sang, p. 161, &c.

effused in consequence of a blow. But, in about a week, the swelling has entirely disappeared, with the aid of bleeding, purging, and the lotion of vinegar and muriate of ammonia.

From the observations and cases, published by that experienced surgeon, Pelletan, it appears, indeed, that a puncture may sometimes be advantageously made in collections of extravasated blood; but, then, this is only after discutient means have had a long trial, and the tumour has existed a considerable time. *

The putrid decomposition of extravasated blood, attended with great local irritation, an erysipelatous affection and sloughing of the part, severe febrile symptoms, and death, sometimes take place, in consequence of the inflammation arising from the violence of the contusion; for, when the parts unavoidably slough, or suppurate, from the degree of injury inflicted, the sloughs and matter become blended with the effused blood, and, in this circumstance, the latter fluid inevitably putrefies. † Here an external opening should be promptly made, and even this will not avail, unless the contents be completely discharged. It matters not, whether the external opening, in a collection of extravasated blood be made by accident or design: putrefaction of such portion of this fluid, as cannot be discharged, and the severe effects already hinted at, are the consequence.

Besides cases, in proof of the foregoing statements, M. Pelletan has related others, tending to shew, that, when the whole of the extravasated blood can be completely discharged, and the sides of the cavity can be so effectually compressed together as to exclude the air, the making of an incision may sometimes prevent bad symptoms, instead of inducing ‡ them. It is acknowledged, however, that, if an opening is made, and the blood cannot be entirely evacuated, nor the cavity obliterated by compression, such practice leads to a putrefaction of the part of the blood left behind, and does much harm. I must leave it to the experienced surgeon to decide, whether it is generally in our power to discharge, thus completely, every particle of extravasated blood, especially in recent cases, where that fluid is not contained in one cavity, but is widely diffused in the interstices of the cellular membrane.

In cases, where extravasated blood putrefies, and the whole cannot be discharged, M. Pelletan § suggests, whether it might

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* See Clinique Chirurgicale, tom. ii. p. 150, 151. Cases 10 and 11.

† Vide Pelletan in the Memoir above referred to, p. 159, &c.

‡ Ibid. p. 192—211.

§ Ibid. p. 237.

not be proper to counteract the process, by introducing into the cavity alcoholized or acid injections, &c. I can conceive, indeed, that, by chemical means, we might stop the putrefactive process in the effused blood; but that the irritation of these injections, on the living and highly inflamed parts around, would do more mischief than the putrid blood itself, and must for ever interdict the practice.

Amongst the examples of contusion, in which the utility of making an incision for the discharge of extravasated blood appears to be decidedly acknowledged, I may mention those, which are improperly called wind-contusions, the nature of which is pointed out in the chapter on gunshot wounds.

CHAP. XXI.

ULCERS.

BY some surgical writers, an ulcer is defined to be a solution of continuity in the solid parts of the body, accompanied with the discharge of a purulent fluid. According to this definition, the term *ulcer* is synonymous with the words *sore*, *suppurating wound*, and *open abscess*. Dr. Thomson thinks this use of the term *ulcer* too general and indefinite. By others, the word is restricted entirely to those solutions of continuity, from which an ichorous, sanious, or vitiated matter is discharged, attended with a loss of substance in the part. Although Professor Thomson thinks more favourably of this definition than of the former, I cannot help expressing a decided preference to the first, for the very reasons which this judicious surgeon has himself suggested.* If we object to calling suppurating wounds, and such abscesses as have burst, ulcers, as long as they discharge healthy pus, what particular reason is there for approving of their receiving this name only when the matter from them happens to be of a bad quality? The healthy or unhealthy state of the discharge from a sore or abscess is an accidental circumstance, depending upon the favourable or unfavourable condition of the parts to admit of the process, by which they are to be healed. If the preceding capricious method of defining an ulcer were to be sanctioned, every ulcer would cease to be so called as soon as the discharge from it presented the appearances of healthy pus; nor could there ever be any such ulcer as that, which has usually been described under the name of the simple, purulent, healthy ulcer. It seems to me, that, in a general sense, we may consider sores or ulcers of every description, as chasms or breaches more or less gradually formed in the substance of the body, by a process, well known by the name of *ulceration*, in which the absorbents of the part remove the old particles back into the system more quickly than the new ones are laid down by the secerning arteries. As a modern writer remarks, ulceration does not invariably spread by that kind of destruction of the parts, where no remnants of the destroyed portions are left. Sometimes portions of the organs which ulceration is about to destroy are observed to slough, and mortification is also partly concerned in extending the destructive process. Such cases are less frequent, however, than other instances, in which we know that a considerable extent of parts has been destroyed, without our being able to find any remains of them. Surgeons have endeavoured to discover the physiological reason of this important phenomenon; and an explanation is offered, which supposes that nutrition ceases in the ulcerating parts, while the destructive function of the lymphatic system, absorption, still proceeds. * Sometimes, however, the destruction of parts, the actual loss of substance, is only apparent; as, when a sore is the consequence of a simple incised wound, that has not united by the first intention, and continued for a greater or lesser time unhealed. Here we have sometimes the appearance of a cavity, from the retraction of the parts; but none of the flesh has been in reality removed, either by the accident itself, or by any subsequent action of the absorbent vessels. An ulcer resulting from such a cause is, therefore, different, in respect to the process by which it is formed, from another sore, in which a chasm is truly produced in the part by ulceration. Also, when an ulcer is the consequence of mortification, and the separation of the sloughs, the process by which the loss of substance is occasioned is very different from what happens in other cases, in which, whatever chasm may exist has been wrought by the activity of the lymphatic vessels. However, even in the instance of sores resulting from mortification, the latter vessels are somewhat concerned, inasmuch as it is by them that the uniting medium between the sloughs and living flesh is removed, and the dead parts loosened, so as to admit of separation. With regard to open abscesses, which have become what are customarily named sores, I think there can be no doubt of their being strictly entitled to this name, because here it is the process of ulceration, which always thins the superincumbent skin, and produces in fact the opening by which the matter is discharged. When the abscess has been opened with a knife, however, before the ulcerative process has commenced for the establishment of a spontaneous aperture, the case is then not essentially different from any other sore arising from an incised wound, in which some particular causes impede direct union, and create a necessity for the more circuitous manner of healing by means of the granulating process. The truth is, in all the foregoing cases, whether sores, suppurating wounds, open abscesses, or large raw cavities left by the separation of sloughs, the parts can be healed only by one and the same process,—the formation of granulations; and the principal differences between these examples are derived from the consideration, that, in suppurating wounds and abscesses, there is not always essentially a loss of substance, which must of course attend every other sore, which is the consequence either of ulceration or sloughing. If the preceding view of things be allowed, and suppurating wounds, especially those of a certain standing, be considered as ulcers, then, of course, I see reasons for not agreeing with Dr. Thomson, that the words "attended with loss of substance" will increase the correctness of the definition, any more than Callisen's expression does, "solutio continui in partibus organicis *lente* exorta," &c.[*] The accuracy or inaccuracy, however, will, of course, depend upon the rejection or not of the suppurating surfaces of old wounds from the cases regarded as ulcers. Were the term *ulcer* entirely restricted to the effects of the process of ulceration, then, of course, loss of substance, and the gradual manner in which the solution of continuity has been produced, would be circumstances perfectly right to be pointed out as essentials in the definition of an ulcer.

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* Lectures on Inflammation, p. 426.

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* Delpech, Précis des Maladies reputées Chirurgicales, t. iii. p. 594.

Several able writers of modern date, however, strongly remonstrate against the plan of considering so many different cases as ulcers. Thus, Delpech[†] defines an ulcer to be "a *spontaneous* solution of continuity in the soft parts, accompanied with a loss of substance in the part affected," and he objects to comprehending amongst ulcers, old suppurating surfaces, the result of external accidents, even though attended with loss of substance. He argues, that accidental solutions of continuity are wounds which nature incessantly tends to heal; which are only kept up by obstacles originating from a very extensive loss of substance; continual returns of inflammation, or the entire absence of it; some physical local disposition of the surrounding parts; the presence of a foreign body; the vicinity of a necrosis; caries; habitual discharge of excrement, or of a secreted fluid. The duration of such a case, he says, makes no difference in the state of things: the quantity of substance continues the same; the removal of the impediments to the efforts of nature restores to her all her full energy; and the natural course of the vital powers necessarily leads to a cure. On the contrary, (observes M. Delpech) in ulcers, the solution of continuity is made without any external agent being concerned: it is the result of an inherent property in the organs affected; and the first effect of the exercise of this faculty, is the destruction of some of the part which is attacked. The longer the ulceration continues, the more extensive the loss of substance becomes; nature mostly makes no effort towards a cure; but, on the contrary, she labours, and this sometimes with alarming rapidity, in the progressive destruction of the contiguous organs. Ulcerations, he observes, always depend upon a diathesis, of the existence of which they even serve as a proof. When mortification takes place, the loss of substance can never be restored.

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[*] Systema Chirurgiæ Hodiernæ, vol. i. p. 379.

[†] Delpech, Précis des Maladies reputées Chirurgicales, t. iii. p. 590.

Delpech, it seems to me, is here rather speaking of *ulceration*, or the process by which sores are formed, than of *ulcers* themselves. To the differences, in this respect, which prevail between the several classes of cases regarded by other writers as ulcers, I have already adverted. One remark offered by Delpech appears decidedly erroneous, viz. that ulcers always originate from a certain diathesis, or, in other words, from internal causes. Many common as well as specific irritations, whose action is entirely local, may excite the process of ulceration. Will not friction and pressure do so? Will not the irritation of a sharp, irregular tooth frequently produce ulcers upon the neighbouring part of the tongue or cheek? And are not chancres themselves at first quite local diseases, excited by the irritation of the venereal poison, applied directly to the part? But, if Delpech mean to exclude such cases from the class of diseases implied by ulcers, we should then be glad to know upon what principle he founds his decision, and, especially, to what class of cases he would then refer them?

The usual causes of ulcers may be said to be abscesses, which have burst, or been opened; wounds which have not healed by adhesion, but continued a certain length of time suppurating and indisposed to heal with facility and readiness; various surgical operations in which the knife has been employed; the separation of mortified parts; different kinds and forms of external irritation; and internal constitutional diseases, many of which are of a specific nature, as scrofula, lues venerea, the scurvy, &c. Sometimes, as Callisen * remarks, the cause of an ulcer is single; while, in other instances, a variety of causes are implicated.

From what has been said, the reader will be already apprised of the good reasons which surgical authors have had for adopting the usual division of all ulcers into *constitutional* and *local*. Yet, even this distinction, true and natural as it is, is to be received with an understanding, that many sores, which at first depend entirely upon internal causes, and are in the beginning of a specific nature, are often changed so much in their nature before cicatrization is completed, that, in their latter stage, they are strictly only local ulcers; while many other sores, which are at their commencement only of a local nature, quite unconnected with internal causes, afterwards change with any change or affection of the general system, and become, in every sense of the expression, constitutional ulcers.

The prognosis of ulcers generally depends, first, upon the nature of the cause, and the facility or difficulty of its removal; secondly, upon the kind of parts attacked, whether of great importance or not in the animal economy; and thirdly, upon the patient's age, constitution, and mode of life.

As Callisen very truly observes, in opposition to the tenor of some of the recent conjectures published by Delpech, the cure of ulcers is generally accomplished by the powers of nature, and energy of the vital principle, art contributing to the beneficial change only inasmuch as she removes any impediments to the healing process. Nature then perfects the cure. The steps which she pursues on such occasions I have endeavoured to describe in the chapters on wounds; and my limits now oblige me to avoid all repetitions. With respect to the art of surgery, it is its province to remove and diminish the causes from which an ulcer has originated; to prescribe a proper regimen, quietude, advantageous posture, and the best dressings. It is only in cases of what have been called *compound* and *constitutional ulcers* that any necessity commonly arises for internal medicines. This term of *compound* is applied to sores, in which the cure is retarded by any complication not existing in what is understood by a *simple* or *healthy ulcer;* and such complication may be either internal or external. Of the former we have a specimen in a scorbutic ulcer; of the latter, in a sore which is prevented from healing by hurtful and improper applications.

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* Syst. Chirurg. Hodiernæ, t. i. p. 380.

Ulcers present themselves in very various forms, but I think it sufficient, in this elementary book, to consider five kinds: viz. the *healthy*, the *irritable*, the *indolent*, the *varicose*, and the *specific*.

1. SIMPLE, OR HEALTHY ULCERS.

Healthy ulcers secrete white thick pus, which does not adhere to the surface, and their granulations are small, and florid, with rather pointed tops. As soon as the granulations have risen to the level of the surrounding skin, those next the old skin become smooth, and covered with a thin semi-transparent film, which afterwards becomes opaque, and forms cuticle.

An ulcer, answering this description, is in a healing state, and the surgeon can only be useful by keeping the surrounding skin clean, applying soft scraped lint to absorb the redundant quantity of matter, and covering this simple dressing with a pledget of any unirritating ointment, with a view of preventing evaporation from the surface of the sore, a thing, which would lead to the formation of a scab, and often change the favourable condition of the ulcer.

A roller may be applied, unless it should seem to act perniciously: in most instances, it not only serves to retain the dressings, and, as a kind of defence to the sore, but also to support the muscles and skin, which are frequently loose and flabby, from the want of the natural exercise of the limb.

I shall presently have occasion to speak of Mr. Baynton's plan of dressing old ulcers of the leg, with long circular strips of adhesive plaster. This method is now not confined to old ulcers, but often adopted with the greatest advantage in cases of simple healthy ulcers upon the lower extremities.

2. IRRITABLE ULCERS.

Irritable ulcers cannot always be known by their appearance, though, in many instances, they can be so discriminated. A sore will invariably partake very much of the nature of the constitution, and when this is known to be irritable, the local complaint will also be often found to be so. A surgeon, however, is frequently quite unaware of this quality of an ulcer under his care, until, perhaps, at the end of a little time, not finding the sore heal sufficiently quick, he ventures to apply some stimulating application, or to roll the bandage round the limb more tightly than at the previous visits. The next day, he is mortified to find that his patient has passed a miserable night, and several discoloured sloughy parts have formed on the surface, and also at the circumference of the sore. At other parts, the granulations have been rapidly absorbed, and whatever matter lies on the surface of the ulcer, is diminished in quantity, and of a blackish, fetid quality. When the excellent plan of treating many ulcers, recommended by Mr. Baynton, was first introduced into practice, I saw much mischief result from the method being very often indiscriminately applied by dressers to the kind of ulcer under consideration.

Some appearances at once shew the ulcer to be of an irritable kind. When the margin of the surrounding skin is jagged, and terminates in a sharp undermined edge; when the bottom of the ulcer is made up of concavities of different sizes; when there is no distinct appearance of granulations, but only of a whitish spongy substance, covered with a thin ichorous discharge; when touching the surface causes pain, and frequent hemorrhage, the sore may be set down as of an irritable description.

Irritable sores are particularly often situated over the lower end of the fibula, the anterior surface of the tibia, and ligament of the patella.

The applications to irritable ulcers should be of the sedative kind. The steam of warm water acts very beneficially on these cases. A warm decoction of poppy-heads, applied every morning and evening as a fomentation, by means of flannels, is highly useful. The extract of hemlock, or opium, dissolved in hot water, makes a very useful fomenting liquor, when the irritability is great.

Emollient poultices may be employed as the continued application, and that made of linseed is the best. It is frequently found serviceable to lay immediately over the surface of the sore, under the poultice, lint dipped in a solution of opium (℥iss. to ℔j. of water). When the weight of the poultice seems to have a bad effect, the lint wet with the above lotion may be covered with a pledget of simple ointment.

The carrot poultice, particularly when made by boiling the vegetable, and beating it into a pulp, deserves to be noticed as a remedy, which agrees with as many irritable sores as any thing known.

Powdered carbon and cream have obtained repute for their good effects on irritable ulcers.

It is of great use in these cases, to have a choice of remedies; for those which agree at first generally lose their virtue after being used a certain time, and it becomes necessary to have recourse to others. Thus six or seven different applications may all have a period at which they are productive of benefit. The pressure of bandages is always pernicious.

3. INDOLENT ULCERS.

The appearances of indolent ulcers are, as Sir Everard Home* observes, the very reverse of those characterizing irritable sores. The edges of the surrounding skin are thick, prominent, smooth and rounded. The granulations are smooth and glossy, the pus is imperfectly formed, and is blended with flakes of coagulating lymph, which adheres so firmly to the surface of the ulcer, that it can hardly be wiped away. The bottom of the sore forms almost a level, and its general aspect gives the idea of a portion of the skin, and parts underneath, having been for some time removed, and the exposed surface not having commenced any new action to fill up the cavity.

This is the most genuine indolent ulcer. In other cases, the appearances bear some resemblance to those of that opposite kind of sore, the irritable ulcer.

Indolent ulcers form the majority of those which are to be seen in the large hospitals of this metropolis. Their granulations are endued with a weak living principle, and are very apt to be suddenly absorbed without any assignable cause.

When poultices are improperly applied a long time to indolent ulcers, the chasms will be filled up with large, loose, pale, glossy granulations, which would never acquire the power of forming a durable cicatrix, if the same relaxing treatment were to be continued. These weak unhealthy granulations, when stimulated by topical applications, undergo a considerable change, becoming smaller, more compact, redder, and free from their glossy appearance, and the cicatrix which follows is more apt to continue healed, than when the sores have been healed by relaxing applications.

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* Practical Observations on the Treatment of Ulcers on the Legs, considered as a Branch of Military Surgery; to which are added, some Observations on Varicose Veins and Piles. Edit. 2. 8vo. 1801.

Solutions of lunar caustic, touching the surface of the ulcer with the caustic itself, diluted nitrous acid, the unguent. hydrarg. nitrat., and the unguent. hydrarg. nitrico-oxydi, and supporting the sore and the neighbouring skin and muscles with a roller, were the usual means employed for healing common indolent sores. Bandages have also been found particularly serviceable to such ulcers. The laced stocking was formerly much used, and it was strongly recommended by Wiseman. As Dr. Thomson remarks*, however, it is in appearance only that this mode of bandaging in ulcerated or varicose legs, has any advantage over that with a common circular roller. The use of the circular bandage, with dressings composed of the unguentum resinæ, and the red oxyd of mercury, in different proportions, was some years ago recommended in a particular manner to the attention of the English public in a very useful treatise †, which Dr. Underwood published upon the treatment of old ulcers of the legs. He allowed his patients to go about their ordinary occupations under this mode of treatment; first, because it was inconvenient for many of them to be confined; and, secondly, because it was found that the cicatrices of many patients whose ulcers had healed up during rest, broke out again as soon as the limb was exercised. The treatment of ulcers with bandages has also found a very zealous advocate in Mr. Whately, who published strongly in favour of the ‡ plan. In the cases which this author has adduced, very little variety of dressing was employed, and, with some exceptions specified by the author, pressure was principally relied upon as the means of cure. This gentleman has given the preference to fine flannel rollers somewhat less than four inches wide.

But of all the improvements which have of late years been introduced into the treatment of old indolent ulcers of the legs, that which was first proposed and practised by

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* Lectures on Inflammation, p. 447.

† Underwood's (Michael) Treatise upon Ulcers of the Legs, in which former Methods of Treatment are candidly examined, and compared with one more rational and safe, proving that a perfect Cure may generally be effected more certainly without Diet and Confinement, than by the strict Regimen in common Use, &c. 3d edit. 1799.

‡ Practical Observations on the Cure of Wounds and Ulcers of the Legs, without Rest. 8vo. Lond. 1799.

Mr. Baynton of Bristol, is by far the most interesting and important.

This gentleman's practice consists in applying strips of adhesive plaster round the limb, so as to cover the sore, and, at least, one inch of the parts both above and below the ulcer. The strips of plaster are to be two or three inches broad, and long enough to surround the limb, and leave an end about four inches long.

The middle of the strip, so prepared is to be applied to the sound part of the limb, opposite the inferior part of the ulcer, so that the lower edge of the plaster may be placed about an inch below the edge of the sore, and the ends are then to be drawn over the ulcer with as much gradual extension as the patient can well bear. As many strips are to be applied in this manner as will cover the whole surface of the sore, and one inch of the limb below and above it. Soft compresses are to be laid over the part, and the limb is to be rolled from the toes to the knee, with calico bandages.

The affected parts are then to be kept moist with cold spring water, which enables the surgeon to remove the strips of plaster, without hurting the patient, and, at the same time, keeps off inflammation. *

The advantages of this method are now fully confirmed by repeated trials, the prominent edges of the sore become levelled, the opposite sides are approximated, so that the cicatrix is rendered smaller than it would otherwise be, the patient can be cured while walking about, and the new-formed cicatrix is stronger, and more likely to continue sound, than after the old method of treatment.

4. VARICOSE ULCERS.

Varicose ulcers, or such as are connected with a varicose affection of the neighbouring veins, mostly occur either on the inside of the leg, near the ankles, or on the instep. Their size and number vary in different cases, their edges are indurated, high, and callous, the sores are painful when touched, and exhibit a brownish red colour, which spreads a good way beyond the circumference. The limb is habitually affected with a kind of swelling, that is always rendered worse by much exercise and long continuance in an erect posture, and better by rest and an horizontal position. In

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* See a "Descriptive Account of a New Method of Treating old Ulcers of the Legs," by T. Baynton. Edit. 2. 1799.

the vicinity of the ulcer, small varicose tumours are observable. These are sometimes insulated, sometimes connected together in clusters.* The varicose ulcer described by Sir Everard Home, has the look of a mild indolent sore, attended with a varicose state of the trunk and branches of the vena saphena. The sore is seldom deep, and is usually of an oval shape. The case is attended with a deep-seated pain, extending up the limb in the course of the veins.

The occasional trouble in healing varicose ulcers, and their tendency to break out again, are generally acknowledged.

A reference to the history of surgery presents us with four methods of treatment. 1. Topical applications. 2. The destruction of the varices. 3. Compression. 4. The operation of tying the trunk of the vena saphena at the back of the knee.

1. With respect to topical applications, I need only state, that all kinds have been frequently tried, and as frequently found ineffectual.

2. Former surgeons having experienced the difficulty of healing these sores, began to pay more attention to the varices in the vicinity. These were now considered as keeping up the disease, and, it was inferred, that if they could be destroyed, a cure would speedily follow. Their removal was chiefly attempted in three ways. 1. Ætius and Paulus, of Ægina, recommended the removal of such swellings by excision. The first of these writers confesses, however, that the plan sometimes, instead of proving successful, occasioned another incurable sore. The same thing is observed by Avicenna, and Bidloo has recorded an example that is a remarkable confirmation of the circumstance. 2. Other practitioners have been content with tying the vein above and below the dilatation, and then discharging the contained blood by a puncture. Such was the practice of Fabricius ab Aquapendente. Scultetus objected to this method, that it sometimes failed, and that the wound frequently changed into an irremediable sore. The varices generally returned, and, according to the observation of Fabricius himself, the ligatures were occasionally rendered unavailing by reason of the numerous venous branches entering the varicose portion of the vessel, and from the same cause, a profuse hemorrhage now and then originated. 3. The varices have also been attacked with caustic, and even the actual cautery. The latter is mentioned by Celsus. I need not detain the reader

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* See Œuvres Chirurg. de Desault par Bichat, tom. ii. p. 517.

with an exposition of the well-founded objections to both these means.

3. Compression, I believe, is the best mode of curing varicose ulcers. The Arabians were acquainted with its utility in the treatment of varices in general. Avicenna describes a compressive bandage, reaching from the lower part of the leg to the knee. Fabricius ab Aquapendente, Scultetus, and Fabricius Hildanus, probably borrowed this mode of treating varices from Avicenna. But the Arabians only ventured to employ compression when no ulcers existed. Yet, it is curious, Hippocrates was aware of the advantage of compressing sores; and it was on his authority, that Paré advised bandages to be applied to ulcers, though not to any great extent beyond the ulcerated part. It remained for Scultetus and Fabricius Hildanus first to extend the employment of the bandage, which Avicenna used for the dilatation of the veins, and the swelling of the legs, to varicose ulcers. The followers of these distinguished surgeons, however, suffered the practice to decline, nor was it revived to any considerable extent, until Theden and Desault placed its merit again in a clear point of view. The advantages of the laced stocking for varices were known to Fabricius ab Aquapendente, Wiseman, and Scultetus; and so was dog-skin, which, on account of its elasticity and suppleness, is a very fit material for a compressive bandage. The common roller, however, is the thing generally employed, the limb being compressed with it equally from the foot to the knee. With a bandage thus applied, over a simple dressing, it is now ascertained that the generality of varicose ulcers may be completely cured. *

4. Sir Everard Home, however, met with cases which resisted compression. For these he practised an operation, which consists in tying the trunk of the vena saphena, as it passes over the knee-joint. The patient is to stand on any thing of a convenient height, the integuments are to be pinched up into a transverse fold, and divided; and a ligature is to be conveyed under the vein with a bluntish silver needle. The vessel becomes impervious where the ligature is applied, and the obstruction serves instead of a valve, to take off the weight of the column of blood. † Having seen this operation followed, in several instances, by severe

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* Œuvres Chir. de Desault par Bichat, tom. ii. p. 518.

† See Home on Ulcers, Varicose Veins, &c.

symptoms [*], I soon began to apprehend that it would fall into disrepute. Others have even known it prove fatal [†], and the practice is now abandoned by the best surgeons of this metropolis. Instead of this operation, another has been proposed by Mr. Brodie, and practised in several instances without being followed by any of the severe consequences often observed after the preceding method. Mr. Brodie's plan is derived from the consideration, that the veins, which are divided in amputation, seldom inflame upon their inner surface, the extension of which inflammation far along the vessel towards the heart, in the instances where the vena saphena had been tied, seemed to have been the cause of all the severe and fatal symptoms, which, in many of these cases, ensued. Hence, Mr. Brodie conceived, that it would be safer to cut the vein completely through, leaving, however, the superincumbent portion of skin undivided, a thing easily accomplished with a narrow, sharp-pointed, slightly curved bistoury, the edge of which is on its convexity. The point of the knife is passed between the skin and veins, until it reaches beyond the vessel. In doing this, the blade is kept with one of its flat surfaces turned towards the integuments, the other towards the vein. Its edge is then to be directed backward, and, by withdrawing the instrument, the requisite division of the vessel is effected. [‡] I am not acquainted with any examples in which Mr. Brodie's plan of operating has been followed by very bad symptoms, but two cases are detailed in a late work [§], in which the vena saphena major was exposed, *by dividing the skin*, and then cut across; the hemorrhage was easily stopped with a compress, but very severe constitutional derangement followed, and both the patients died. To these reflections we must add another one, in relation to the use of the knife, and of ligatures for the cure of varicose ulcers, viz. that the obliteration of a part of the tube of the vena saphena major by these means, does not always ensure the patient from a return of the diseased vessels to their former state, with all the uneasiness, pain, and inconveniences which were experienced previously to such operation. This arises from other veins, which run parallel to the saphena, becoming enlarged after the ligature of it, and thus rendering the operation unavailing. Perhaps, simple pressure and a horizontal position are yet the safest and best means of curing and relieving varicose veins and ulcers.

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[*] See also a case in Hodgson's Treatise on the Diseases of Arteries and Veins, p. 551.

[†] See London Medical Review, vol. ii. p. 556. Oldknow, in Edinb. Med. and Surg. Journ. vol. v.; and Surgical Essays, by A. Cooper and B. Travers, p. 216, &c. 8vo. London. 1818.

[‡] Brodie, in Medico-Chir. Trans. vol. vii. p. 195, &c.

[§] Hodgson on diseases of Arteries and Veins, p. 555—558.

5. ULCERS WITH SPECIFIC ACTION.

By a specific ulcer, is implied one which is complicated with some peculiar morbid action, owing to the state of the constitution, or to the disposition of the part affected. The varieties of such ulcers are almost numberless, and baffle description. Scrophulous and venereal sores are specific; cancer, and lupus, or the noli me tangere, are also of a specific nature. Some of the inveterate ulcers, into which many venereal sores change, after the syphilitic action has been destroyed, are probably specific: they are mentioned in the chapter on the venereal disease.

Ulcers occur on the instep and foot, with a very thickened edge, and a diseased state of the surrounding skin, very similar to elephantiasis in appearance. Sir E. Home observes, that he has several times met with them in the servants of opulent families, who have led indolent lives, and lived freely. In cases of this sort, the hydrargyrus sulphuratus ruber is recommended by Sir E. Home to be used as a fumigation. In some instances, an ointment composed of calomel and hog's lard, or of the ung. hydrarg. nit. mixed with camphor, is said to answer better than any other application.

A class of irritable ulcers, situated in the vicinity of the ankle, attended with enlargement of the joint itself, and surrounded with a degree of thickening, are much benefited, according to Sir E. Home, by poultices and fomentations, containing the conium maculatum (hemlock).

There is a kind of ulcer, which does not extend more deeply than the cutis, but spreads in all directions. The specific morbid action does not continue in the parts which have ulcerated, but only affects the edge of the skin where the ulcer is increasing; for, the surface first affected heals, while the parts beyond are in a state of ulceration. For such ulcers, of which there are several varieties, a solution of the argentum nitratum is the best application.

The last specific ulcer which I shall here notice, is the *fungated* one. It is seen on the calf of the leg and sole of the foot, shooting out a fungus from the surface. The new-formed substance is extremely broad, and narrow at its root; it is tender, and bleeds from very slight causes. The disease in its origin, somewhat resembles a scrophulous affection of the metatarsal bones, until the skin ulcerates, and the fungus protrudes.

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* See Practical Obs. on Ulcers of the Legs, by Sir E. Home, p. 299. 2d Edit.; and Hodgson on Diseases of Arteries and Veins, p. 560.

One species of this ulcer contaminates the lymphatic glands in the course of absorption; another kind does not do so. The first case cannot be cured by the internal and external use of arsenic; the second may. From three to ten drops of a solution, made by boiling white arsenic in water for several hours in a sand heat, may be internally given. For external use, ʒi of this solution is diluted with ℔j of water, and the mixture may be gradually made stronger, till it is of double strength. A better mode of exhibiting arsenic internally, is to give two drams of the following formula thrice a day. ℞ Kali arsenicati gr. ij. aquæ menthæ sativæ ℥iv, spiritus vinosi tenuioris ℥j; misce et cola. This solution, with double the proportion of kali arsenicatum, forms also a very neat external application. Soft bits of lint may be dipped in it, put on the sores, and covered with a simple pledget.

CHAP. XXII.

ENCYSTED TUMOURS.

THESE swellings consist of a cyst, in which is contained a matter, extremely various in its appearance and consistence. Sometimes it is soft, sometimes quite fluid, and in other instances hard, and even ossified. The cyst of the latter kind, occasionally bursting, the indurated contents gradually protrude, so as to occasion the curious appearance of horns. In St. Bartholomew's hospital, some years since, a complete horn was removed from the scrotum by Sir J. Earle. It had begun as a tumour, which, after bursting, protruded from its inside the horny substance.

In the British Museum is preserved a curious specimen of ahorn, which grew from a woman's head, and, in all probability, was formed by a process similar to that which I have mentioned. In Mr. Astley Cooper's possession is a still more remarkable specimen, which was given to him by

Dr. Roots, of Kingston, and which, in shape and size, bears a close resemblance to a ram's horn! It also grew from the head, and had been preceded by another horny excrescence, similarly situated and shaped, which had likewise been removed. I was informed, that this same patient, who was a gardener at the above town, had afterwards a third horn growing in the identical place from which the two preceding ones had been cut away. Here, possibly, there was a portion of cyst remaining, that had the power of secreting the horny matter.*

When the contents of an encysted swelling are fluid, like honey, the tumour is named *meliceris;* when of a pappy quality, *atheroma;* when fatty, *steatoma.* These swellings have a soft or hard feel, according to the nature of their contents, but the consistence of the contained matter cannot always be acertained by the touch, especially when the cyst is exceedingly thick.

Sometimes the cyst is very thin, sometimes of considerable thickness, but in general, though not always, its thickness is proportioned to its age. It is often quite firm, like parchment or cartilage, and it commonly contains only one cavity; however, this is frequently intersected by several partitions. Steatomatous tumours sometimes consist of distinct contiguous cysts, which may be easily separated from each other.

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* In the Philosophical Transactions, vol. lxxxi. p. 95, &c., may be seen an interesting paper by Sir E. Home, explaining the manner in which certain horny excrescences are produced. The formation of horny excrescences in various parts of the body would appear, however, to take place from different processes in different cases, as far as we can judge from the numerous curious instances on record. Many of them were unquestionably not the product of a cyst. My limits will now only allow me just to make a reference to some of these lusus naturæ. Saviard, Obs. 127. p. 554. Fabricius Hildanus, Centuriæ 2. Obs. 25. Journal de Médecine, t. xiv. ann. 1761. p. 145. Cocchi, Græc. Chirurg. p. 124. Cabrolius, Obs. Anat. 11. Bonn, Thesaurus Ossium Morb. p. 88. Benedetti, de Curandis Morbis, lib. i. cap. 14. Philosophical Trans. 1678, No. 170. Lassus, Pathologie Chir. t. xi. p. 564. Parkinson, in Mem. of the London Medical Society, vol. iv. p. 391. Gastellier, in Mém. de la Societé de Méd. 1776. p. 312. Bartholin, Hist. Anat. Cent. 5. Hist. 27. Majorat, in Gazette Salutaire de Bouillon, 1788, in Hufeland's Annalen, Bd. i. p. 447. No. 109. Alibert, in Dict. des Sciences Med. t. iv. p. 251. Vicq d'Azyr, in Mém. de la Soc. de Med. 1780. p. 494. Caldani, in Mém. di Verona, t. 16. p. 127. Dumonceau, in Journ. de Med. t. 14. Fevr. 1761. Carradori, Opusc. Scelti di Milano, vol. xx. Osserv. Filos. sopra due corne umane, p. 23—34. Rigal, in Dict. des Sciences Medicales, t. iv. p. 251. Otto, Seltne Beobachtungen u. s. w. Berlin, 1816, p. 109. Goquelin in Sedillot's Journ. Gen. de Méd. t. 54. 1815, p. 96. Ash, in Phil. Trans. No. 176. Musäius, Diss. de Unguibus Monstrosis, Hafn. 1716, &c.

Atheromatous swellings on the head usually have a very thick firm cyst.

Encysted tumours are mostly situated immediately under the skin, but, occasionally, they form in deeper situations. Such swellings, especially steatomatous tumours, frequently attain an enormous magnitude. Ordinarily, they are not at all painful. At first, they are constantly moveable, and probably would continue so, if all external pressure were kept from influencing them, but, in time, they generally become more fixed, in consequence of being adherent to the skin and subjacent parts.

Many persons appear to have a pre-disposition to encysted tumours: more than twenty have been met with in one patient. * Such swellings are common enough in most parts of the body; on the head they certainly occur with particular frequency; I have seen them oftener in this situation, than any other. Mr. Hey notices the frequency of atheromatous tumours upon the heads of adults. He has seen the scalp almost covered with them. In children, the atheroma often occurs on the face, forming tumours about the size of a pea, which are smooth, and appear rather whiter than the skin. These, after a time, inflame and burst, the contents are discharged, and the part commonly heals. Hence, the complaint is generally left to take its own course. When such atheromatous swellings take place, as they often do on the eyelids, and particularly, when they are near the eyelashes, they may excite ophthalmy, and occasion opacity of the cornea. Hence, their extirpation is the most prudent measure. Mr. Hey makes an incision into them, in the direction of the fibres of the orbicularis muscle, presses out the contents, and then extracts the cyst with a pair of forceps. †

Some writers on surgery approve of attempting to bring about the absorption of encysted tumours; but it is only in a very few cases that the dispersion of them can be accomplished. This does not seem extraordinary, when we recollect that the contents are often a thick, unvascular matter. Besides, even if it were in our power to bring about the absorption of what is contained in the cyst, still the cyst itself would remain, and its extirpation would be requisite. ‡

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* Practical Observations on Cancer, by John Howard, p. 2.

† Practical Observations in Surgery, p. 517, 518. Edit. 2.

‡ Some very good observations on the general inefficacy of internal and external medicines, for the removal of encysted swellings, and on the advantages of an early recourse to the scalpel, have been published by the eminent German surgeon Loder. See his Chirurgisch-Medicinische Beobachtungen, Erster Band, p. 205. et seq. 8vo. Weimar, 1794.

After promoting the absorption of the contents of encysted tumours, or after discharging them by an opening, it has indeed been recommended to obliterate the cavity of the cyst altogether, by making its opposite sides grow together, by means of external pressure. But there is always some risk in irritating encysted tumours, and cases are not wanting in the records of surgery, by which it is proved, that such diseases are, in this manner, very capable of being converted into fungous and inveterate ulcers, and even carcinoma.*

The applications which have gained most repute for discussing encysted tumours, are such as contain sea-salt, muriate of ammonia, &c.

Some surgeons have destroyed swellings of this kind with the kali purum and quicklime; but the method, as being tedious, unnecessarily painful, and attended with a chance of exasperating the disease, is undeserving of imitation.

The best practice, on the whole, is the operation by which the swellings are cut out. The art of doing this with adroitness, consists in dissecting the parts, surrounding the tumour, without wounding the cyst. If the latter accident occur, the contents frequently flow out, the cyst collapses, and the continuance of the dissection is attended with more difficulty. It is a great point to remove every particle of the cyst, and, hence, it is satisfactory to take it out entire, that is, without wounding it. When any portion remains behind, the wound will frequently not heal, in consequence of fungous granulations, arising from the diseased part. Unless the swelling be large, a single incision through the skin is sufficient, but, in other instances, it is advantageous to make two cuts in this manner (); first, because they facilitate the removal of the tumour; secondly, because they prevent a redundance of skin which would take place, if none were removed, and greatly retard the cicatrization of the wound.

After the operation, the edges of the wound are to be brought together with sticking plaster, and a compress and bandage applied.

The excision of encysted tumours, externally situated, is mostly very easy, as the cyst is only slightly connected with the surrounding cellular membrane. But there may be more difficulty when the swellings have been in a previous state of inflammation, or when they are exceedingly large.

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* See some cases in Abernethy's Surgical Works, vol. ii. p. 115. 119.

CHAP. XXIII.

GANGLIONS.

A GANGLION is a small hard tumour, unattended with pain, and composed of a cyst, which is of a firm tendinous texture, connected with a subjacent tendon, and filled with a fluid resembling the white of an egg. It is usually more or less moveable beneath the skin; its growth is slow, and it is seldom much larger than a hazel-nut. Its figure is commonly round, smooth, and even; it seldom inflames, and still more rarely does it suppurate; but, when the latter event happens, an ill-conditioned ulcer is generally produced.

Ganglions occur most frequently on the hands and fingers, and either over a tendon, or ligamentous expansion, with which the sac is connected underneath. But, there are instances of these tumours making their appearance in many other situations, and they sometimes attain a considerable magnitude. A ganglion has been known to cover the whole back part of the neck.* These tumours appear sometimes to be the consequence of a bruise, or violent sprain. Occasionally they move along with the tendon, to which they are attached; while in other instances they seem fixed.

Deformity, and impediment to the use of some particular muscle are the utmost inconveniences commonly resulting from this disease, but when the tumour ulcerates, a very foul, and even dangerous ulcer may be the result. †

The common plan of treating ganglions is to apply pressure, or stimulating applications to them, with a view of causing them to be absorbed. Binding a piece of lead on the tumour with a roller, is a very good method; and, when the stimulating plan is preferred, the oleum origani, or hartshorn, may be used as a liniment Mr. Warner found, that saponaceous liniments mixed with opium, and that plasters, composed of soap and mercury, had the greatest power in dispersing ganglions. He also mentions camphorated mercurial ointment, as having been successful. No doubt, when ganglions are only attached to the subjacent parts by a slender pedicle, they might be as safely cut out as encysted tumours, if care were taken to leave no part of the sac behind. The disease, however, is not severe enough to induce most patients to submit to an operation, particularly as the tumours may in general be greatly diminished, if not quite dispersed, by the preceding measures.

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* Cases in Surgery, by Joseph Warner, p. 165. edit. 4.

† See Medical Journal, vol. v.

Supposing, however, all attempts to disperse a ganglion are ineffectual, and the parts are disabled, in consequence of the size and situation of the tumour, ought the surgeon to advise the extirpation of the disease? In my belief, it is his duty, in these circumstances, to recommend the operation. Admitting, that in its performance, wounding the subjacent tendon or ligament cannot be avoided, daily experience proves, that accidental wounds of these parts commonly terminate well. The great object in this operation is to remove every particle of the cyst. That ganglions may be safely cut away, when they are obstinate and troublesome, is fully proved by numerous cases on record. *

Some writers mention a method of curing ganglions by striking them with a hammer, book, &c. so as to rupture the cyst, and cause the contents to be diffused in the adjacent cellular substance. I know a gentleman, who lately got rid of a ganglion in this manner, after trying in vain stimulating applications, pressure, &c. and many other instances of the success of the practice have been mentioned to me. Were it necessary to state any thing further in favour of this plan, I might add, that it is often adopted by Mr. Astley Cooper. †

I have seen several ganglions dispersed by keeping open a little blister over them. The application of caustic or setons to ganglions cannot be too much censured, as being, of all methods, the most likely to change the complaint into an irritable fungous disease, or cancer-like affection, and when a cure happens to be produced by such means, it is always at the expence of unnecessary pain and trouble. Mr. Astley Cooper has sometimes adopted the plan of puncturing ganglions with a needle, and thus let out their contents, when other methods have failed, and he has never seen inflammation, nor any serious consequence excited by such practice. ‡

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* See Warner's Cases, p. 165. 170. edit. 4. Gooche's Chirurgical Works, vol. ii. p. 376. Heister's Institutions of Surgery, part ii. chap. 171.

† See Medico-Chirurgical Transactions, vol. ii. p. 359.

‡ See this last work, loco citato.

CHAP. XXIV.

SARCOMATOUS TUMOURS.

FLESHY tumours, not contained in a perfect globular cyst, like that of the foregoing swellings, have received this appellation. They are of very various kinds, and consequently every attempt to devise appropriate names to distinguish them is at least laudable.

Mr. Abernethy, whose ingenuity is ever active in the advancement of medical science, has published a classification of tumours, and to him we owe the plan of applying to the various species of sarcoma terms deduced from their anatomical structure. *

1. COMMON VASCULAR, OR ORGANIZED SARCOMA.

Under this title are comprehended all tumours, which appear to be composed of the gelatinous part of the blood, rendered more or less vascular by the growth of vessels through it, without having any distinguishable peculiarity of structure. This kind of organization in tumours is the most simple, and, perhaps, may always precede other descriptions of structure.

Vascular sarcoma not only makes its appearance as a tumour, which is altogether extraneous, in regard to the original fabric of the body, it also enlarges natural parts, particularly the testis, mamma, and absorbent glands.

When this sort of swelling has attained a considerable size, the superficial veins become quite varicose. If left to itself, the tumour generally grows till the skin is so distended that it ulcerates, and exposes the new-formed substance, which sloughs and falls out.

The disease might be got rid of in this manner, but such are the constitutional irritation attending it, and the fetor and frightful appearance of the part, that the rest of the swelling is generally removed by an operation.

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* See his Surgical Works, vol. ii. p. 261, &c.

2. ADIPOSE SARCOMA; OR LIPOMA.

Fatty tumours, often termed also *lipomatous*, or *adipose*, are formed by an accumulation of fat in a limited, and generally very circumscribed extent of the cellular substance. The structure of adipose sarcoma is absolutely the same as that of the adipose substance, such as it appears to be in those situations where fat naturally collects; with this difference, however, that the interstices of the cellular membrane, thus affected, are of considerable size, and obviously enlarged. The integuments, which are distended, and rendered much thinner than natural, constitute a sort of sac, spread over the mass of fat, of which the tumour is composed, nothing appearing to be interposed between them and the swelling itself, if we except a very thin capsule, that is slightly connected with the substance of the tumour by means of many small vessels. There are some cases, where the partitions of cellular membrane, forming the cavities in which the fat is deposited, are thicker, and more compact, than in the natural state; and when a section is made of such a tumour, the exposed surface presents a marbled appearance, of a yellow and white colour. Delpech thinks, that this species of adipose sarcoma is more disposed to become cancerous than the common forms of it; but, as far as my observations go, true adipose tumours have as little tendency as any sort of swelling to change into true carcinoma.

Fatty swellings are very frequently of an oblong pyramidal shape, and have a narrow pedicle, which is itself of a fatty texture; but, sometimes they have a base, which is as broad as the whole mass of the tumour. They are met with in persons of all ages; but are most frequent in adults. The shoulders, the back *, and the neck are particularly common situations for them. Their occurrence, however, is so frequent, that there are few surgeons who have not had opportunities of seeing them in almost every region of the body. I once saw an adipose tumour, which grew on a man's thigh, and after it had been removed by Mr. Cline, in St. Thomas's hospital, was found to weigh between fourteen and fifteen

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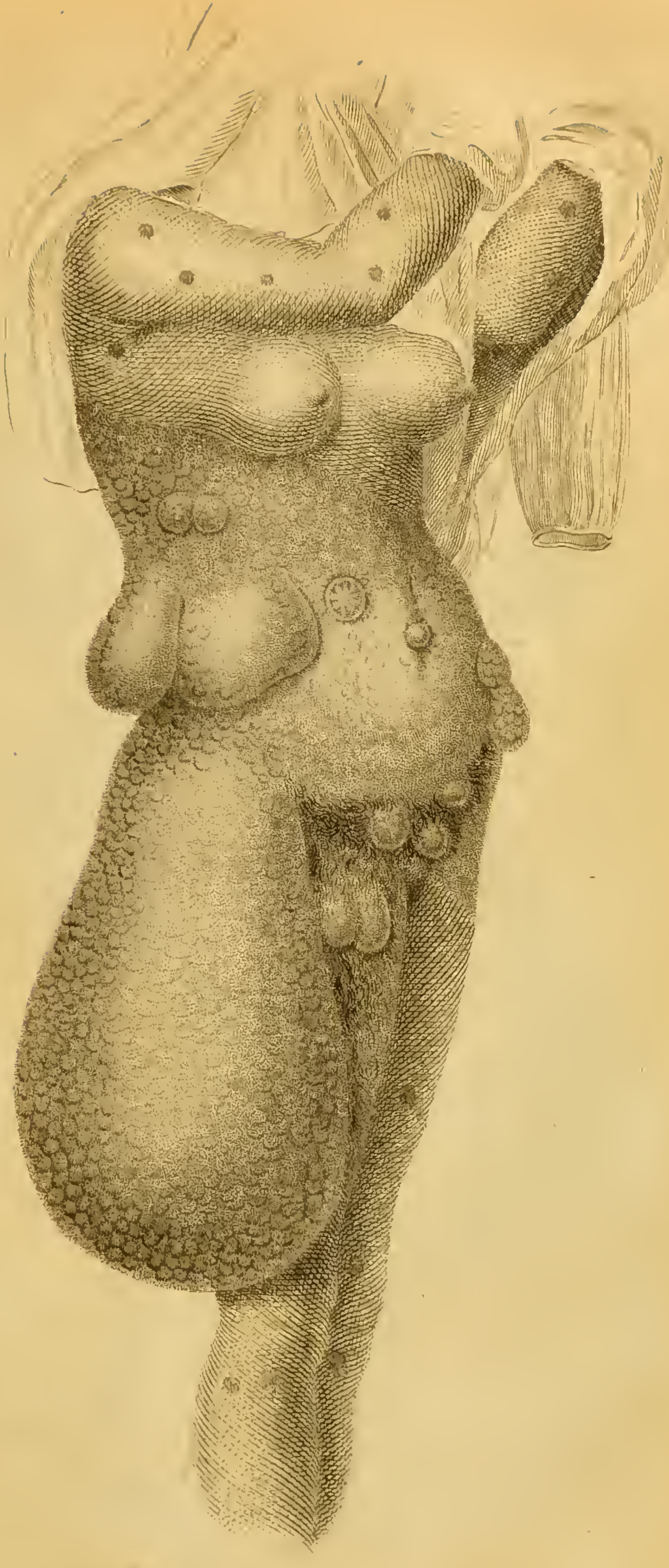
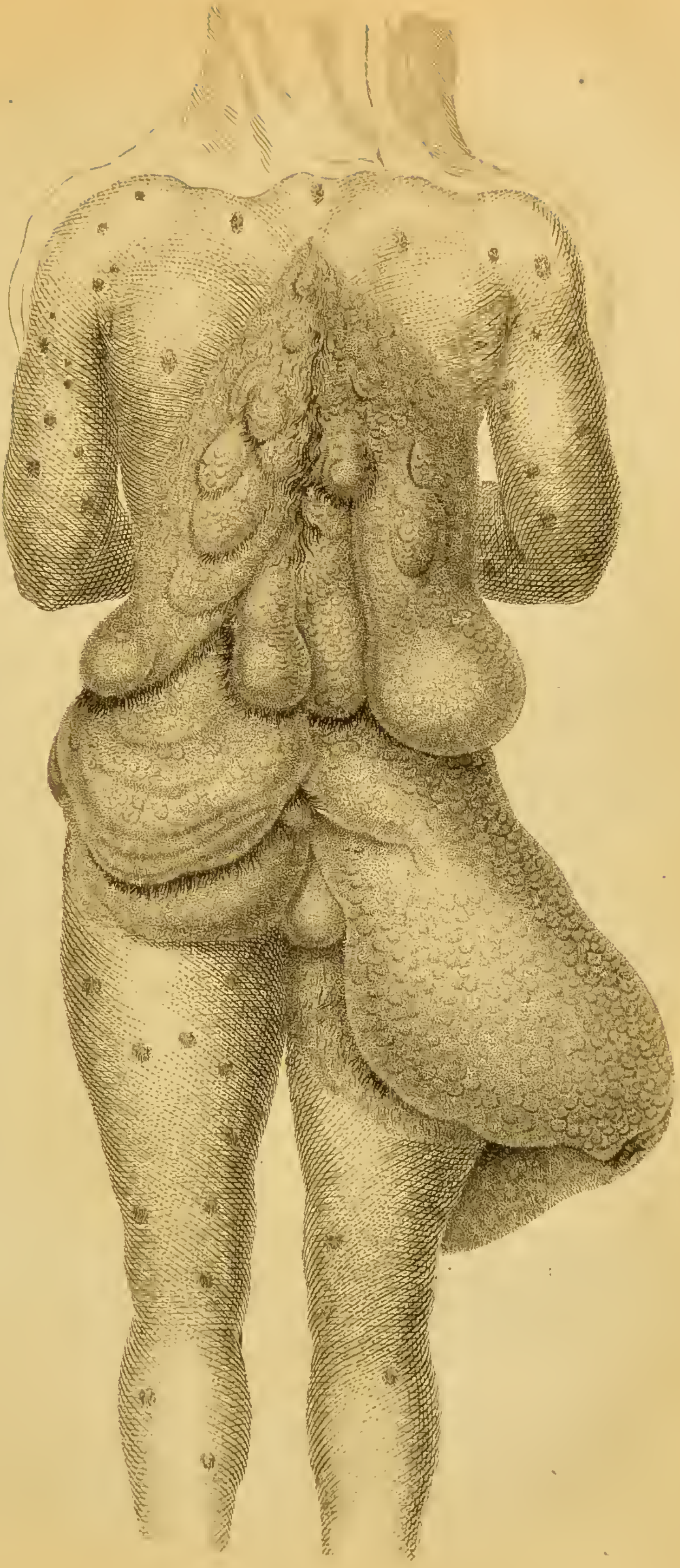
* See Walther uber die angebohrnen Fetthautgeschwulste und andere Bildungsfehler, p. 29. Fol. Landshut, 1814. Annexed is the figure of a very curious congenital fatty swelling, taken from an engraving in the preceding book. It was accompanied with several others of inferior size. Walther successfully removed it with a knife; but was obliged in the operation to take up several arteries as large as the thoracic. The girl, who was healthy, with the exception of these extraordinary swellings, recovered very well; and afterwards had another tumour extirpated with equal success.

Plate



Published March 21. 1840, by Longman & C°. Paternoster Row London

Plat



London Published March

pounds. My friend, Mr. Copeland, removed another, of still more enormous dimensions, the weight being above twenty pounds. The extirpation of two immense sarcomatous swellings is also described by Walther, in the work cited below; and several other surprising cases of a similar description are upon record. *

Sometimes adipose tumours are formed in parts, in which there is naturally but a small quantity of fat: thus, Delpech has seen a fatty swelling in the labia pudendi, the structure of which is very different from fat. † Sometimes adipose swellings are formed betwixt the peritoneum, and the parietes of the abdomen, in which circumstance the tumours make their way outwards under the integuments, drawing along with them the part of the peritoneum to which they are attached. Such cases are improperly named by some of the French writers "herniés graisseuses."

Adipose tumours generally grow in a regular, slow, and progressive manner; their vessels are neither large nor numerous. Hence, the removal of these swellings is attended with little danger from hemorrhage, and they are very easily separated from the surrounding parts. When they have been inflamed, however, the detachment is more difficult.

The causes of the growth of adipose tumours are not known: the disease has been sometimes ascribed to blows. and other kinds of external violence; but I agree with Delpelch in believing, that this doctrine is incorrect.

The shape and slow growth of adipose tumours might suffice to indicate their nature; but they present other characters, amongst which the consistence of the mass of the swelling deserves particular notice. These tumours are not elastic, but have a peculiar soft feel, resembling what is perceived on handling a bag filled with cotton. Their surface is unequal; but the irregularities, which are distinguishable through the thin integuments, have no firmness, and are obliterated by compression. These circumstances, however, are only strongly marked in such adipose tumours as have not yet acquired an immense size, and remain free from every complication. When the swelling has become exceedingly large, its weight, its magnitude, its pressure on the surrounding vessels and integuments, materially obstruct the circulation, and œdema then taking place between the skin and

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* Acrell, Chirurg. Vorfalle übers. von Murray, Bd. 2. Dotzauer, in Loder's Journ. für die Chirurgie, &c. B. 1. St. 1. This last weighed 25 pounds.

† Précis Elem. des Mal. Chir. t. 3.

adipose substance, the consistence of the latter may appear to be increased. A surgeon of experience, however, will yet be able to detect the inelastic softness, which is peculiar to all fatty tumours. Any previous attack of inflammation may also harden the parts around an adipose sarcoma, and even cause ulceration: a state, which should never be confounded with cancer.

Adipose tumours, though large, may continue a great many years, without producing any pain, or inconvenience, provided they remain free from irritation. These swellings may grow with more or less rapidity, or may remain of the same size for a very long time; but they have never been known to disappear spontaneously, and (except in a few instances in which they have been made to slough and ulcerate by caustic and stimulating applications, a plan on every account to be reprobated) all attempts to disperse them invariably prove ineffectual. The only safe mode of cure is the knife.

3. PANCREATIC SARCOMA.

This is the term which Mr. Abernethy applies to such sarcomatous tumours as resemble the pancreas in their internal structure.

The substance of which they consist is composed of irregular-shaped masses. These are connected together by a fibrous kind of texture. This species of sarcoma is sometimes formed distinctly in the cellular substance, but, most commonly, occurs in the female breast, perhaps originating in the lymphatic glands.

Mr. Abernethy mentions a case, in which the lymphatic glands beneath the jaw were affected with pancreatic sarcoma. The disease increases slowly, and is not prone to inflame and suppurate.

The morbid structure in question frequently takes place in the breast, a little above, and on that side of the nipple which is next to the arm. In general, the disease is chronic, and does not involve the absorbent glands in the vicinity. But, in a few instances, this species of sarcoma, when situated in the breast, deviates from its ordinary indolent nature, and occasions severe and lancinating pain, an inflammatory state of the integuments, and an adhesion of them to the tumour. The axillary glands also enlarge.

Pancreatic sarcoma is sometimes so irritable a disease, that Mr. Abernethy thinks it may frequently be considered as bad as a cancer. When the glands in the axilla become affected, one generally swells at first, and is extremely tender and painful; afterwards the pain abates, and it remains indurated; another then becomes affected, and runs through the same course.

Dr. Bouttatz, of Moscow, has published an account of a tumour which resembled the pancreas in its structure, and grew beneath the conjunctiva of the eye.

4. CYSTIC SARCOMA.

This name is applied because the disease contains cysts, or cells. Cystic sarcoma sometimes occurs as a distinct tumour, but is commonly met with in the testis and ovary. The cysts, both in the former and latter part, are capable of being rendered red by anatomical injection. The cavities generally contain a serous fluid, but sometimes a caseous substance. Mr. Abernethy believes this last sort of case, when the testicle is concerned, is peculiarly intractable.

5. MASTOID, OR MAMMARY SARCOMA,

So named from its resemblance to the mammary gland in structure. Mr. Abernethy has not frequently seen this kind of tumour, and his attention was called to the nature of the disease, by a case, in which a swelling, partaking of the above structure, and about as large as an orange, was removed from the front of the thigh. The wound seemed at first disposed to heal, but it afterwards degenerated into a malignant ulcer, which occasioned death in the course of two months.

As this kind of tumour is gradually lost in the surrounding parts, which probably retain a disposition to assume a similar morbid alteration, Mr. Abernethy very judiciously recommends a more extensive removal of them, than was practised in the above example.

Mr. Abernethy thinks this kind of sarcoma more malignant than the preceding species; but not so much so as the following.

6. TUBERCULATED SARCOMA

Consists of an aggregation of small, roundish tumours, of various sizes and colours, connected together by a kind of cellular substance. The size of the tubercles is from that of a pea to that of a horse bean, or sometimes larger; their colour is of a brownish red, and some are of a yellowish tint.

Mr. Abernethy has chiefly seen this disease in the lymphatic glands of the neck. The tumours ulcerated, became painful incurable sores, and destroyed the patients. Tuberculated sarcoma is so terrible a disorder, that it may be deemed a fatal one: fortunately it is uncommon.*

7. MEDULLARY SARCOMA.

This is commonly seen affecting the testis, and has been termed the soft cancer of that part. The tumour resembles the structure and appearance of the medullary substance of the brain.

In consequence of the diseased state of the testis, the inguinal glands on each side become affected with the same morbid change, and acquire a very enormous size. The skin covering the disease in the groin gives way, and the most prominent of the enlarged glands inflame, and are gradually detached in the form of sloughs. Hemorrhage succeeds the separation of each slough, and can only be suppressed by means of continued pressure. After all the dead portions have been thrown off, the skin heals, and continues cicatrized till the distention of another gland renews the foregoing process, and the patient is at length exhausted.

Dissections after death evince, that the glands in the pelvis and abdomen are affected with the same disease.

Mr. Abernethy relates a case, in which a tumour, partaking of this structure, formed on the thigh. The base of the disease was situated near the bone. The lymphatic glands in the ham, pelvis, and loins, were all affected with the same morbid enlargement; as was evinced by dissection after death.

The facility, with which medullary sarcoma is propagated along the absorbent vessels, is one of its most striking peculiarities.

The medullary sarcoma is often considered to be exactly the same sort of disease as the fungus hæmatodes, to which a chapter in this work is allotted.

Mr. Abernethy adds another species of sarcoma, which he calls *carcinomatous*. This I shall omit in the present chapter, because the name does not properly enter into the above arrangement, which is founded on the anatomical structure of tumours; and because carcinoma cannot always be considered as a tumour, the diseased part frequently being shrunk, and even smaller, than in the healthy state; and lastly, because cancer is a sufficiently important subject for a separate chapter.

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* See Abernethy's Surgical Works, vol. ii. p. 51. Lond. 8vo. 1811. No doubt, this is the cancrum melœneum, or cancer tubereux, of Alibert.

In France, the plan of naming the different kinds of tumours according to their consistence and internal structure, has also been introduced. "Already (it is remarked) an immense number of dissections have taught us how to unravel and reduce to certain anatomical elements a multitude of tumours, whose variegated structure and appearances had eluded every description. By a final analysis, it is found, that all these swellings are reducible to a certain number of morbific, or *accidental* textures, each of which has a peculiar structure, always presenting the same characters, whatever may be the part in which it is situated. Sometimes these textures are found unmixed; sometimes blended and variously combined to the number of two, three, or four, in the same tumour. They have been studied in all these different states, and in every stage of their developement. Wherever they exist, they can be distinguished, even when they are intimately united, and blended together." *

OF THE GROWTH OF SARCOMATOUS TUMOURS, AND OF CHRONIC INFLAMMATION.

Every kind of fleshy tumour, every enlargement of an original part of the body, can only be the effect of an unnatural action in the vessels. Whatever matter is deposited in the interstices of a gland, or any other part, must be placed there by those secerning arteries, which, in the healthy state, only secrete a sufficient quantity of new particles to supply the old as fast as these are removed by the absorbents. Thus the action of the sceerning arteries, and that of the lymphatics, ought to be equal; and whenever more matter is deposited by the blood vessels, than is taken away by the absorbents, a tumour forms in the disordered part. It is possible to conceive, however, that when original parts are enlarged, the morbid change may be owing to an imperfect absorption, and not to any wrong action of the blood vessels. But in cases of tumours, which are quite distinct, and which constituted no original part of the body, the formation of the disease is probably always the result of a morbid state of the surrounding arteries.

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* Dictionaire des Sciences Medicales, t. iii. p. 340. The following are the names which the French propose for the seven general structures of all tumours; *Squirre; Encéphaloide; Corps Fibreux; Mélanose; Tubercule; Cartilage Accidentel; Fibro-Cartilage Accidentel.*

The process by which sarcomatous tumours, and indolent indurations and thickenings, are formed, is termed *chronic inflammation.* The blood vessels, which we must generally suppose to be the active organs in these cases, deposit a superfluous quantity of new matter; and to do so, they must assume an increased action, though not attended with throbbing, heat, pain, and redness, as in cases of acute inflammation.

It is very likely, that coagulating lymph is the first kind of matter, which is thrown out from the vessels, in the early stage of sarcomatous tumours; and that it then becomes vascular itself, and is converted by the action of its own vessels into the various kinds of morbid structure already mentioned.

In proportion as a tumour increases in size, it compresses the surrounding cellular substance, which becomes converted into a kind of membranous capsule, surrounding the swelling. In sarcomatous cases, the cyst is generally thin; and, sometimes, there is even no cyst whatever.

The growth of indolent tumours does not disturb the constitution; they form in an insidious manner, without increased heat, and generally without any uneasiness in the part.

A tumour, when once it has begun to form, becomes itself an additional source of irritation, and a cause of increased action in the vessels. Hence, it will continue to enlarge, unless checked by surgical applications, or removed by the knife.

TREATMENT OF SARCOMATOUS TUMOURS.

Surgeons are not only ignorant of those particular causes, which produce the commencement of the growth of the various descriptions of fatty, fleshy, indolent tumours, they also know of no effectual means, by which the progress of the disease can be stopped, and the patient freed from the inconveniences of continually bearing about with him a mass of redundant matter, which in a chronic state is both a deformity and an oppression; and, in an inflamed or ulcerated state, is a source of severe pain and even of fatal mischief. It has been conjectured that topical bleeding and cold applications would check the growth of indolent tumours; but experience teaches us to place no dependence upon the plan. Attempts have also been made to promote the absorption of the new formed substance by means of mercurial frictions, blisters, electricity, and stimulating discutient applications. These methods, however, are not recommended by many examples of success; and they are attended with some risk of irritating the tumour, without lessening it, in which case the disease sometimes changes from an indolent quiet form to an irritable state, in which it inflames, enlarges, ulcerates, emits fungi, and assumes a character as intractable and dangerous as that of cancer itself. When local stimulating applications succeed, it is usually by their inflaming the whole swelling, and causing it to ulcerate and slough. This, however, when it answers, is on the whole a more severe method than extirpation with the knife, and often induces alarming constitutional illness, to which the patient sometimes falls a victim. I remember a man, who had a considerable sarcomatous tumour extending from the angle of the jaw over the side of the neck. The late Mr. Ramsden, by means of stimulants and escharotics succeeded in making it ulcerate; but the disease now put on so aggravated an appearance, with incessant darting pain, fever, delirium, &c. that the patient did not live beyond three or four days from the period when the tumour began to ulcerate and slough.

For the reasons which have been explained, the practice of trying to disperse indolent sarcomatous tumours is then not deserving of praise. The removal of the disease by the knife is the best measure, and the sooner it is done the better; for a common adipose tumour, now about the size of an apple, and capable of being extirpated with the utmost safety, may, in the course of a few years, become so large as to weigh from fifteen to twenty or thirty pounds; and the magnitude of the wound necessarily made in cutting out so large a mass may prove highly dangerous and even fatal. Besides, sarcomatous tumours, when removed in an early stage, are less apt to leave the surface of the wound complicated with any impediments to a radical cure.

When the tumour is known, at the time of the operation, to be either a mammary, a tuberculated, or medullary, sarcoma, care should be taken to make a free removal of the surrounding substance.

The operation is performed in the same way as that of removing a diseased breast, and for an account of it the reader is referred to the chapter on the latter subject.

CHAP. XXV.

OF CANCER.

GENERAL REMARKS.

UNDER this denomination, Sir E. Home comprehends such diseased appearances, as are capable of contaminating other parts, either by direct communication, or through the medium of the absorbents; and when the distemper approaches the skin, produces in it small tumours of its own nature, by a mode of contamination not at present understood. There is (says this gentleman) a disease, by which parts of a glandular structure are very frequently attacked, particularly the os tincæ, the alæ of the nose, the lips, and the glans penis. This has been called cancer; but it differs from the above species, in not contaminating the neighbouring parts, with which it is in contact, and, in neither affecting the absorbent glands, nor the skin, at a distance from it. It is an eating sore, which is uniformly progressive; whereas, in cancer, after the sore has made some progress, a ridge is formed upon the margin, and the ulceration no longer takes that direction. It also differs from cancer in being oftentimes curable. *

In the present imperfect state of our knowledge of cancer, the greatest difficulty, in determining many of the most important questions concerning the complaint, undoubtedly arises from one term embracing numerous forms of disease. While some authors, like Sir Everard Home, are endeavouring to confine the name of cancer to one kind of case, others have no scruple in calling nearly every induration a schirrus, and every intractable ulcer a cancer. Nay, a splendid work has recently appeared, in which are minutely described the symptoms and characters of six different species of cancer, to each of which a particular name is assigned; viz. *cancrum fungoides* (ordinary cancer); *cancrum terebrans* (cancer of the skin, noli me tangere); *cancrum eburneum* (so called from its ivory hardness); *cancrum globosum*, attended with globular swellings, which are frequently indolent, of a red, violet, or blackish colour, and sometimes ulcerate and bleed, and which are rarely limited to one part, but occupy a large extent of surface, often upon the scalp, along the limbs, or upon the belly; *cancrum anthracineum*, so named by M. Jurine, of Geneva, from its black colour; it has never been seen but in the integuments, where it makes its appearance as a black spot, accompanied with an annoying pruritus; the spot increases, and becomes still darker in the centre, when the epidermis is found to be slightly elevated and granulated like a mulberry; *cancrum melæneum* (cancer tubereux) is said commonly to occur in the cellular substance, in the form of a multitude of tumours, which, in shape and form, resemble the vegetable growths called truffles. Some of these swellings are not larger than a pea, while others are as big as the fist.* As I do not understand the propriety of classing so many different cases together, I shall be content with merely mentioning this arrangement, suggested by M. Alibert. The proposal serves as a further proof of what has been already said, that cancer is a term which is extended to a great variety of intractable ulcers and tumours, and without much discrimination; and that when different authors are speaking of cancers, they are frequently speaking of very different kinds of disease.† It is by this fact that we must reconcile the discordant statements about the effects of remedies, and the possibility of a cure. In the following pages, the observations are meant chiefly to apply to schirrus and cancer, as these diseases are seen in their most common forms, affecting the breast, testicles, &c.; and though allusion has been necessarily made to cancer of the lip, face, and a few other parts, I am perfectly aware that these cases are often of a different nature from the former, in the essential circumstances of appearance, changes actually produced in the parts, greater curability, &c.

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* Home's Observations on Cancer, p. 146. 8vo. Lond. 1805.

The cases adduced by Sir E. Home are strongly in support of the opinion, that cancer is at first entirely a local ‡ disease. They also tend to establish another point, namely, that cancer is not a disease which immediately takes place in a healthy part; but is a distemper, for the production of which the part must have undergone some previous morbid change. Thus, we see pimples, small tumours, or warts, upon the nose, cheek, or prepuce, remaining for ten, fifteen, twenty, or thirty years, without producing the smallest inconvenience; but, at the age of sixty or seventy, upon being cut in shaving, bruised, or otherwise injured, changing into cancers. The same point also seems to be confirmed by the many indurations and indolent tumours of the breast, which remain quiet for years; but on being irritated by accidental violence, become cancerous.

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* See Nosologie Naturelle, ou les Maladies du Corps Humain distribuées par Familles, par J. L. Alibert. tom. i. p. 540, &c. fol. Paris, 1817.

† The modern French surgeons candidly acknowledge their inability to define cancer, while its causes are unknown; and they confess, that they chiefly mean by the term any disease which has a tendency to destroy the parts attacked, and by degrees all the neighbouring textures without distinction; and which, when left to itself, never gets well, &c. &c. See Dictionaire des Sciences Medicales, t. iii. p. 538—540. In other pages, however, no disease is allowed to be cancerous unless it contain either the structure which the French call *squirre*, or what they term a *cerebriform substance.*

‡ On this point, Abernethy's Surgical Works, vol. ii.; Pearson's Principles of Surgery, edit. 2.; and Newnham's Practical Observations on Cancer, in London Med. Repository, vol. iv. p. 353, &c.; and art. Cancer, in Dict. des Sciences Med. t. iii., deserve to be consulted. Roux believes that cancer may sometimes be local at its commencement; but that, in other instances, it is connected with internal causes, though, as we shall presently find, he refutes the notion of a cancerous virus existing in the constitution.

Cancer is said to prevail much in particular families, and is still regarded by some of the latest writers as an hereditary complaint.* We are not to understand, however, that this is so much the case, that because a mother has a cancer, her children must necessarily be afflicted with the same disease. A very intelligent writer on this subject observes, that the hereditary nature of cancer is a question not so easily resolved as one might at first suppose. Certainly, he remarks, we often meet with several cancerous diseases in the same family; and he has himself collected many very remarkable facts of this kind, which he means to publish with the requisite details. In one family consisting of five individuals, he has met with a cancer of the breast, another of the face, and a schirrus of the stomach. In another family, the father died of a cancer of the tongue, and the son was afflicted with a noli me tangere of the face. A man, who had a cancer of the stomach, remembered that his mother had had a cancer of the face. A woman, who died of an ulcer of the uterus, had two sisters, one of whom died with a cancer of the breast, while the other was yet living with a cancerous disease on her neck. In another family of seven persons, one woman died of cancer of the bladder; another of cancer of the breast; and a man of a cancerous disease of the brain. With respect to the other four remaining individuals of this family, one died of an acute complaint, and the other three (says M. Bayle) are still enjoying good health. These observations, and many others to be met with in authors, appear at first decisive; but when it is considered (observes this author), that next to tubercular (scrofulous) diseases, cancer is the most common organic lesion, and that at Paris, out of every seven persons who die above the age of twenty, at least one always falls a victim to a cancerous disease, can we, says M. Bayle, without fear of mistake, ascribe the existence of several diseases of this kind in the same family to an hereditary disposition?[*]

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* Pearson's Principles of Surgery, ed. 2. p. 225. Alibert supports the same opinion, and mentions a lady, who died of cancer of the uterus, whose mother and grandmother both perished of the same disease. See *Nosologie Naturelle*, &c. t. i. p. 556.

Another position which I have to lay down is, that cancer is rather a disease of old than of young persons. Exceptions to this remark undoubtedly occur. Sir E. Home mentions an instance of cancer in the breast of a young lady aged fifteen. The true cancerous structure, however, is seldom seen under the age of twenty-five or thirty.[†] Cancer of the eye is most frequent in children, although, from the observations of Mr. Wardrop, there is some reason for believing, that what has often been regarded as this disease, is, in reality, the fungus hæmatodes of that organ. The cancer scroti, however, is frequently observed in young lads.

Cancer is most prone to attack the female breast and the uterus. It seldom affects the breasts of the male sex, though I have seen one example that was supposed to be such; and also another case, which, though it resembled cancer externally, had not internally the carcinomatous structure; but, if possible, was a worse affliction than cancer, being complicated with a general disease of the glands, in the course of the abdominal aorta, which were immensely enlarged, and changed into a greenish substance, much like turtle. This last patient died in St. Bartholomew's Hospital in the year 1813. Cancer often invades the testes, lips, penis, and tongue, the miliary glands of the skin, and many other parts of a glandular structure. On the whole, though women may not so often have cancerous lips, they are much more subject to the disease than men[‡]: the change of the constitution at the cessation of menstruation is thought to favour the access of the malady: and this circumstance, together with the uterus and mamma being the parts on which the distemper is most disposed to make its attack, fully accounts for the great liability of the female sex to cancer. In women who have been accustomed to menstruate in large quantity, the uterus is frequently attacked when that evacuation ceases.[§]

The disease unquestionably appears to be more malignant in some situations than others. Relapses are very common after the extirpation of a cancerous breast; but they are not frequent when a carcinomatous lip, or testicle, has been taken away in proper time. It is said, that a part of a schirrous tonsil may be left behind in an operation; and yet the circumstance will not hinder the patient from receiving material relief, since cancerous ulceration is, in this instance, not disposed to break out with ungovernable malignity, as usually happens when a portion of other cancerous tumours is left unremoved in an operation.

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[*] See Dict. des Sciences Medicales, t. iii. p. 677. This statement of one death out of every seven at Paris being caused by a cancerous disease, is only another proof to my mind, that the French call many complaints cancers, to which an English surgeon would never dream of extending such a name.

[†] Wardrop on Fungus Hæmatodes, p. 189.

[‡] Howard on Cancer, p. 9.

[§] Pearson's Principles of Surgery, p. 225.

According to M. Roux, the skin, the cellular substance, the mucous membranes, the glandular secreting organs, and, perhaps, the lymphatic glands are the only parts of our system, which are capable of being primarily affected with * cancer. This author does not think, that the disease affects certain parts exclusively: he believes that it is its nature to extend to a great many; but, then, this is consecutively and by propagation. He thinks, that the disease never begins by attacking muscles, serous membranes, tendons, cartilages, &c. It will be universally allowed with this writer, that, in a vast number of cases, the skin is the primary seat of cancer. The skin of the face seems particularly disposed to be affected, whether we refer the circumstance to its delicacy, its great vascularity, or to its being frequently exposed to external irritation. Other parts of the skin, however, are sometimes attacked. Wiseman has seen a cancer on the scalp; Gooch, on the inside of the thigh; and Richter, at the navel. In chimney-sweepers, cancers have frequently occurred on the back of the hand, or foot. The affection of the skin, preceding cancer, is represented as being constantly determined by external causes, and not, in general, without a long continuance of them. Thus, for instance, in cancer of the lips or other parts of the face, the disease is at first a small pimple, or slight excoriation. Being incessantly irritated, the excoriation spreads, or the pimple enlarges and ulcerates. The history of a dreadful case of cancer of the face, which originated from the accidental wound of a wart on the part with a pair of scissars, is well detailed by Alibert: whoever reads it, I think, will never forget it.† The part becomes acutely painful; an acrid, irritating discharge takes place; and the veins around become varicose.

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* Mémoire renfermant quelques vues générales sur le Cancer, in Œuvres Chir. de Desault par Bichat, t. iii.

† See Nosologie Naturelle, ou les Maladies du Corps Humain, distribuées par Familles, t. i. p. 544. fol. Paris, 1817.

In general, cancer of the skin, when left to itself, is slow in its progress, especially, with regard to its effects on the constitution.

According to M. Roux, certain affections peculiar to the cellular substance may terminate in cancer, while the skin and subjacent parts are at first sound. This second primary seat of cancer, however, is allowed to be less frequent than the skin. But, in proof of its being so sometimes, the tendency of encysted tumours to become cancerous is adduced. *

Mucous membranes are, even more frequently than the skin, the primary seat of cancer. To this place we must refer such cancers of the eye as begin on the conjunctiva, cancers of the nasal cavities, tongue, œsophagus, stomach, bladder, uterus, penis, and intestines, particularly the rectum. In all these organs, M. Roux believes, that cancer first commences in the mucous membrane, and that the neighbouring parts are subsequently invaded, as the disease spreads.

The causes of cancer in mucous membranes are not less various, than the states which precede the distemper in these organs.

1. In some few uncommon instances, the disease follows different affections, which, naturally, have no tendency to it. Thus, certain fungous diseases of the pituitary membrane, when rashly irritated by local applications, or fruitless attempts at complete extraction, are sometimes rendered cancerous. The same remark is made on certain venereal ulcers, which at first only affect the surface of the glans penis, but afterwards assume a cancerous disposition, and attack the greater part of the penis.

2. Sometimes the parts would appear to be at once struck with the cancerous disorganization, nothing being discernible but a fungous ulcer, of more or less extent, unattended with any vestiges of a previous tumour. Of this nature are some cancers of the stomach, especially such as are situated at the lower part of this organ, and have been thought to be caused by hard drinking. Most of those about the cardiac orifice present the same character; as well as some cancers of the intestines and uterus, and almost all those of the bladder.

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* As we have no evidence of encysted tumours being composed of cellular substance, but, on the contrary, have reason to believe them to be new-formed parts, they will not, of course, furnish the illustration intended by M. Roux. Nothing is a clearer proof that, when authors comprehend amongst cancers the fungous diseases, which sometimes issue out of an irritated ulcerated encysted tumour, they speak of disorders totally different from cancer in other situations.

3. But in general, cancer of mucous membranes begins with a more or less considerable tumour, termed scirrhus, the mechanical effects of which depend on its situation. Thus, in the pylorus, it sometimes completely obstructs the passage of the aliment, and in the rectum renders the evacuation of the feces difficult and painful.

That M. Roux himself was conscious of having comprehended several varieties of disease in the preceding remarks, is clear enough; for he says there is a vast difference (though it is not known what) between this first degree of cancer in mucous membranes, and that state which is the forerunner of cancer in a gland, notwithstanding both affections are expressed by the same term.

M. Roux thinks that the scirrhus of mucous membranes in important organs, as the stomach, intestines, uterus, &c. mostly proceeds from general causes; and he holds the same sentiment with regard to cancer of the breast. Among the causes suspected, he enumerates an acute susceptibility in the constitution, the principal revolutions of life, long grief and trouble, the suppression of natural or artificial discharges, &c.; and (says he) if an hereditary organic disposition to cancer be admissible, it is particularly in these instances.

By such observations, however, the influence of external irritations is not meant to be excluded.

Cancer of glandular secreting organs is alleged to have more precise limits than the same disease in any other structure. Take, for example, cancer of the breast, or testicle. The gland, says M. Roux, is already deeply disorganized, and yet the skin may remain sound. The glandular secreting organs, susceptible of being primarily affected with cancer, are, according to this author, very few. The lachrymal gland, he affirms, is never attacked, except in consequence of the progress of cancer of the eye. The salivary glands are said never to be the first seat of cancer, and according to this gentleman, the breast and testicles appear to be the only glands exposed to the primary attack of that distemper. I believe, however, few surgeons in this country will join in this observation. In the two last organs, the disease is, more constantly than in mucous membranes, preceded by the state called scirrhus. In Desault's works, however, one instance is mentioned, where a lady, arrived at the critical period of life, was attacked with a considerable swelling of the breast, unattended with induration, but rapidly ending in a large cancerous ulcer, that proved fatal in less than three months. But such cases are rare, and the disease is almost always preceded by induration and scirrhus, during the existence of which the tumour is, for the most part, indolent. It is only the essential nature of cancer to cause acute pain, after it has attained a certain advanced state, just as it is its character to affect particular structures.

M. Roux conceives that scirrhus of glandular organs is mostly produced by external causes, though frequently, especially in cancer of the breast, an internal disposition may have influence. This observation seems to be proved by the disease occurring, with particular frequency, at the revolution which happens in the female constitution at the cessation of the menses. But, the fact, that the disease may sometimes arise entirely from external violence, seems to derive confirmation from scirrhus of the breast in men having been observed to proceed from such a cause. This circumstance is said to have been noticed by Hunter, Pouteau, and Pegrilhe. In Desault's works, however, it is confessed that facts of this description are not numerous; though they serve as an argument against the sentiment, that cancer of the breast is always owing to a change in the menstrual evacuation.

That there is a material difference between scirrhus of the stomach, intestines, and uterus, and that of the breast and testicle, is beyond a doubt; but in what such difference consists is not exactly known.

The author of the memoir on cancer, in Desault's works, appears to believe, with Mr. Pearson, that, perhaps in all instances, cancer of the lymphatic glands is a secondary affection. Mr. Wardrop, however, has seen two instances of primary cancerous affections in lymphatic glands; similar cases have occurred to Mr. Abernethy *; and Klein, in noticing Mr. Pearson's statement, tells us, that he once extirpated a very large original scirrhus of a lymphatic gland, situated upon the serratus major anticus, to which it adhered so intimately, that it was necessary to cut away with the swelling a portion of the muscle. †

We shall next follow M. Roux, and consider the progress of cancer. 1. After the commencement of the local affection, the neighbouring parts soon become disorganized. 2. Then the nearest lymphatic glands swell, and are the first parts at a distance participating in the disorder. 3. The last stage of cancer is marked by the effects of the local disease on certain very remote organs, and on almost every function.

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* See Wardrop on Fungus Hæmatodes, p. 188.

† Chirurgische Bemerkungen, p. 262.

In the first progress of a cancerous affection, the adjacent parts are not attacked according to their degree of proximity. The surrounding cellular substance, indeed, is soon affected; but then it is to be recollected, that there is an intimate communication between the cellular substance which composes our organs, and that which forms their external covering.

In general, whenever the skin is near the focus of the distemper, it is in it that the first vestiges of the extension of the malady are manifested. This is observable in cancer of the breast, and in that which follows encysted tumours in the cellular membrane. The organization of the skin may be already injured, and the surface of the tumour ulcerated, while the whole swelling may still be moveable, and the disease not have extended itself at all to the layers of muscles, or other subjacent parts. M. Roux inclines to the opinion, therefore, that cancer, in its progress, is always prone to invade such neighbouring structures first, as are of a nature to be sometimes the primary seat of the malady.

On the other hand, when cancer affects organs, which are covered with a serous membrane, the latter part is affected only in an advanced period of the disease. Thus, scirrhus of the pylorus exists a long while, without the peritoneum being at all diseased. Cancerous affections of the testicle prevail a long time without the tunica vaginalis becoming affected. It is remarked, however, by M. Roux, that the more the local progress of cancer is limited by particular circumstances, the more rapid and formidable are the effects of the disease on remote parts, as, for example, the lymphatic glands.

Notwithstanding the resistance which certain parts, at the circumference of a cancerous affection, appear to make against the extension of the disease to them, a period at length arrives when such opposition is overcome. All the parts, comprehended within the sphere of the activity of the disease, are affected with one common disorganization, and soon every vestige of them is utterly lost. Perhaps the blood-vessels are the parts which make the longest resistance to these ravages. The texture of the arteries seems to be that which is the most slowly consumed by cancer. MM. Bayle and Cayol have seen arteries, denuded and nearly separated from their natural connections in the midst of an ulcerated cancer, continue in this state a very long time, during which all the other surrounding parts were destroyed with considerable rapidity.* The hemorrhages which almost always attend the latter stages of cancer are a proof, however, that the blood-vessels are not altogether spared by the distemper. Even the subjacent bones at length suffer from caries and absorption; and it is usually asserted, that the whole skeleton may participate in the general influence of the disease.*

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* Dict. des Sciences Med. t. iii. p. 549.

In a cancerous affection of long duration, the lymphatic glands with which the diseased part communicates usually swell. The same thing sometimes happens in the very commencement of the disease, while the part is only in the state of scirrhus.

In cases of cancer, which cannot be removed, nor cured, the following symptoms attend the latter progress of the disease.

The digestion begins to fail; and most patients are averse to ordinary food, and even vomit up whatever little they swallow. Some individuals, however, retain a voracious appetite to the last. The imperfection of nutrition causes the patient to fall away, look thin, and decline into a state of marasmus. The serous exhalation from the cellular substance is not at all affected; nor do dropsies often occur, except when the cancer is in an organ covered with a serous membrane. The secretions are much affected, as may be judged of by the almost continual diarrhœa, and the daily changes visible in the bilious and urinary secretions. The incessant and increasing pain, the losses which are going on and never repaired, and the privation of sleep, soon brings on general debility. To such effects, hectic fever is to be added; and as soon as it begins, fresh grievances commence, the disease advancing with increased rapidity towards its fatal termination. Hitherto, the intellectual faculties remain perfect; but sometimes in the latter stage of the case, the patient loses all consciousness of his state.

M. Roux next considers the particular effects which the disease has upon certain organs, namely, the skin and bones. In the majority of cancerous diseases, the skin has a yellowish or lead-coloured tinge, and is dry and scaly; and, with respect to the bones, M. Roux participates in the common belief, that they become deprived of their organized part; that the calcareous matter predominates in them; and that they become, in the latter stages of cancer, friable and brittle: an assertion, the general truth of which, as I have said, is positively denied by M. Bayle.

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* The fragility of the bones in the advanced stages of cancer has been of late positively denied. See Dict. des Sciences Medicales, t. iii. p. 553. "Les os ne sont pas plus fragiles que chez les autres sujets du même age. Cette dernière assertion paraîtra, sans doute, inexacte, si on la juge d'après ce qu'ont avancé la plupart des auteurs; mais, nous ne craignons pas qu'on la trouve telle si on la verifie dans la nature : elle est le résultat d'une très grand nombre d'observations particulières," &c.

* Dict. des Sciences Med. t. iii. p. 549.

The preceding assemblage of circumstances constitutes what has been termed a cancerous diathesis.

The duration of this state varies much in different cases. Some patients soon fall victims to the progress of the disease; while others lead a long life of misery and suffering. A few individuals, in whom the distemper becomes almost stationary, suffer little more than the anxiety and disgust inseparable from the complaint. During youth, cancerous diseases are said to make much more rapid advances than in old age. The nature of the constitution, though not exactly understood, also makes a vast difference. The progress of the disease may likewise be accelerated by the situation in which the patient resides, by diet, mode of living, painful emotions of the mind, the use of improper applications, &c.

A modern writer tells us, that a gentleman, who saw his only daughter, whom he tenderly loved, die from the effects of a fall, became covered in a few days with cancerous tumours, of which he perished in dreadful sufferings.* "Mental trouble," says a distinguished surgeon, "has the worst effects upon scirrhi: in consequence of this, I have seen a small indolent scirrhus, of twelve years' standing, enlarged to the size of an apple in three weeks, attended with intolerable shooting pains, and in seven weeks become an open † cancer." Hence, when once an operation is decided upon, he recommends it to be performed as soon as possible, as the fear of it is likely to produce, in a very short time, the worst consequences upon the nature and state of the disease.

Many writers have referred all the phenomena of a cancerous diathesis to the existence of, what they have called, a cancerous virus, which they suppose to be formed in the seat of the disease, and thence conveyed by absorption over the whole system. This doctrine, however, wants foundation. We see the lymphatic glands often become affected, while the disease is only in the state of scirrhus, and before any kind of matter is formed. Such glands are sometimes not affected for years after the existence of the disease; a circumstance that seems inconsistent with the penetrating and irritating qualities of this supposed virus. As an experienced surgeon remarks, we possess no proofs that cancerous matter, when applied to a sound person, is capable of acting as a contagion, so as to produce a disease similar to that by which it was formed. Cancerous matter applied to an abraded surface, will sometimes produce an ill-conditioned ulcer, but not a truly cancerous sore.* MM. Biett, Lenoble, Fayet, and Alibert, inoculated themselves at the Hospital of St. Louis, at Paris, with the ichorous matter which exuded from a horrible fungous cancer of the breast of a dying woman; but without suffering any ill consequences. Two dogs were also allowed to lick the cancerous ulcers in that establishment, and eat up the diseased masses which had been extirpated: yet the animals throve very well, and felt no ill effects from this disgusting diet.† Some surgeons have not thought it always necessary to remove the axillary glands, when they are diseased, together with a breast: an opinion that I would recommend for the consideration of the operative surgeon.‡ But whether this idea be true or not, the swelling of such glands may certainly sometimes be the effect of irritation or sympathy, and not of an absorbed virus. This is the sentiment supported in Desault's works. Were it true that all the symptoms of a cancerous diathesis depended upon the impression of a cancerous virus on our organs, it must matter little whether the poison originates in this or in that part. How then does it happen that cancer is more quickly fatal in some organs than others? Cancers of the uterus and breast are of short duration, compared with those of the skin and cellular substance. There must, then, be an influence exercised by the diseased organ itself over the whole economy, independently of the absorption of the virus, supposing such a thing to happen. This influence is, in all probability, the sole cause of all the phenomena of a cancerous diathesis, and it seems to be proportioned to the importance of the organ, and its functions in the system. No one can question, that in some instances, women, reduced to a state of marasmus, have been lastingly cured by the removal of a cancerous breast.* Such facts overturn all the conjectures respecting the effects of a cancerous virus circulating in the body.

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* Alibert, Nosologie Naturelle, &c. p. 557. fol. Paris, 1817. From this and other curious facts on record the reader must draw his own conclusions. To me they are by no means decisive proofs of the thing, which they are designed to prove, because, out of the great many persons who are continually in grief, trouble, &c. I see no reason why a few should not be attacked with cancer, or if already labouring under it, why they should not sometimes get suddenly much worse, just as we frequently see happen, when mental affliction is altogether out of the question.

† Chr. Klein, Chirurgische Bemerkungen, p. 259. 12mo. Stuttgart, 1801.

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* Pearson's Principles of Surgery, edit. 2. p. 259.

† Alibert, Nosologie Naturelle, &c. p. 558.

‡ "Once (says a very excellent surgeon) I was obliged by a profuse bleeding to leave the operation unfinished, and not remove some very indurated axillary glands; but, during the treatment, they disappeared, a circumstance which their hardness did not allow me to entertain the least expectation of." *Chirurgische Bemerkungen, von Chr. Klein, p.* 263. 12*mo. Stuttgart*, 1801. I have lately heard of several instances, in which hardened glands in the axilla, left after the removal of diseased breasts, have subsided and given no trouble. I am far from meaning to say, however, that these glands should never be removed.

Relapses cannot rationally be explained by such a doctrine; for if a cancerous virus existed every where in the constitution, and produced a return of the disease, why is not cancer of other parts excited? Why also do secondary operations frequently succeed? Why likewise does the application of caustic to a livid fungous part of the wound, after the operation, sometimes completely prevent the threatened recurrence of the distemper? Is it not more reasonable to explain these facts, by concluding, that the parts in the vicinity of the cancerous affection, are, at the time of this latter being removed, already in a state of disorganization, undiscoverable by the most attentive and experienced eye.†

OF SCIRRHUS, OR CANCER, PREVIOUS TO ULCERATION.

A hard and painful glandular swelling, having a disposition to become cancer, says Richter‡, is the common, but inadequate and erroneous, definition of scirrhus. The disease is not regularly attended with swelling; sometimes scirrhous parts diminish in size, and shrink. Hardness is not a characteristic property; for many tumours, which are not scirrhous, are exceedingly indurated. The disease is not always situated in a gland; it frequently attacks structures, which cannot be called glandular§; and hard glandular swellings are often seen, which do not partake of the nature of scirrhus. The disposition to cancer cannot be enumerated among the marks of scirrhus, since it is not discoverable till carcinoma has actually commenced. Its termination in open cancer is not an invariable occurrence; and other tumours become cancerous, to which no one would apply the term scirrhus.

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* See a case of this kind related by Morgagni: de Sedibus et Causis Morborum. Epist. 50. Art. 16. besides numerous others on record.

† See Mémoire, renfermant quelques Vues Générales sur le Cancer, par P. J. Roux, in Œuvres Chirurgicales de P. J. Desault, par X. Bichat. tom. iii.

‡ Anfangsgr. der Wundarzneykunst, Band. 1. p. 260. edit. 3.

§ "Muscular and membranous parts I have known to be affected with scirrhus, as well as those which are strictly glandular. A fatty membrane I have seen affected with the same disease." Dr. Baillie in a letter to Dr. Adams. See Observ. on the Cancerous Breast, by the latter, p. 54.

The term scirrhus must undoubtedly have some definite meaning, when employed by scientific men. Unreflecting surgeons may use the word vaguely; and, perhaps, influenced by its etymological import, they may call an immense number of various morbid indurations scirrhi.

I have always considered scirrhus as a diseased hardness, in which there is a propensity to cancerous ulceration, and a greater backwardness to recede, than exists in any other kind of diseased hardness, although the skin may occasionally not break during life, and a few scirrhous indurations may have been lessened.

Though Richter states, that this disposition cannot be discovered till carcinoma has actually taken place; though Mr. John Burns* and Sir E. Home † confirm, that other indurations and tumours may terminate in cancer; though Mr. Abernethy ‡ shews, that sarcomatous and encysted tumours may end in most malignant diseases, and such as are as bad as cancer; yet it is now well ascertained, that, in all these instances, the changes, which precede cancerous ulceration, bear no resemblance to the genuine scirrhus.

The puckering of the skin, the dull leaden colour of the integuments, the knotted and uneven feel of the disease, the occasional darting pains in the part, its fixed attachment to the skin above, and muscles beneath §, form so striking an assemblage of symptoms, that, when they are all present, there cannot be the smallest doubt that the tumour is a scirrhus, and that the disease is about to acquire, if it has not already acquired, the power of contaminating the surrounding parts, and the lymphatic glands, to which the absorbents of the diseased part tend.

But, it is not to be denied, that the diagnosis is frequently more obscure. In some cases scirrhus is moveable, and not fixed to the subjacent parts; and the disease may be indolent, without much pain, or without discolouration of the skin. In the female breast, the part first affected may be very small, and feel like a loose pea under the skin; in other instances it may be more extensive and deeply situated. Neither is the swelling always irregular and craggy: a late writer describes it as being generally roundish and renitent. He describes the skin, at an advanced period, as being smooth and shining, and having a reddish hue, inclining to purple. He tells us, also, that an external strongly marked cancer, when much distended, and tending to ulceration, but not actually ulcerated, may be compared with a hard, prominent carbuncle, before it sloughs; for they have each a similar hardness, with a shining prominence; and if the cancer be adherent to a broad base, there is posteriorly a similar firmness and immobility.*

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* Dissertations on Inflammation, vol. ii.

† Observations on Cancer, case 1. and 2., and p. 145—148, &c.

‡ Classification of Tumours, vol. ii. of his Surgical Works.

§ In advanced cases of cancer in the breast, the disease is frequently not only adherent to the pectoralis major, and intercostal muscles, but even to the ribs. See Howard's Pract. Obs. p. 18.

The progress of a scirrhus, before ulceration takes place, is generally slow; but when this last process commences, the ravages of the disease mostly spread with great rapidity. Sometimes, instead of absolute ulceration, an exudation occurs upon the skin, followed by an excoriation and scab. The late Mr. Howard attached much importance to the preservation of this kind of scab, which he thought defended the part for a time from further ulceration, and thereby served to prolong the patient's existence.†

CHARACTERS BY WHICH SCIRRHUS MAY BE DISTINGUISHED FROM OTHER DISEASES.

A scirrhous induration is not prone to acquire the magnitude, which almost all other tumours are apt to attain, when their growth is not interrupted.

Other tumours, especially when they have not been inflamed, are commonly much more moveable than scirrhi.

If we except the fungus hæmatodes, other tumours do not involve every kind of structure, skin, muscle, cellular substance, &c.; and the integuments seldom become affected before the distention, produced by the size of such swellings, becomes very considerable. In scirrhous cases, the skin soon becomes contaminated, discoloured, and puckered.

Some few tumours may he harder and heavier than a few scirrhi; but the reverse is commonly the case.

In a scirrhus of the breast, the part affected is generally hard, heavy, and connected with the mammary gland; and, when moved, the whole gland moves along with it. *

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* Howard, Practical Obs. on Cancer, p. 19. and 22.

† Ibid. p. 19.

As other indurations and tumours may assume the cancerous action, and even end in cancerous ulceration; and as some true scirrhi, when not irritated by improper treatment, may continue stationary for years; the occurrence of actual carcinoma cannot prove that the preceding state was that of scirrhus. The only criterion of the latter disease, which we possess, is deduced from the assemblage of characters already specified; for, except the peculiar puckering, and speedy leaden discolouration of the skin, no other appearances, considered separately, to which at least we can have recourse before the dissection of the part, form any line of discrimination.

In parts which have become scirrhous, the structure usually consists of a very firm light brown substance, intersected by membranous or ligamentous septa, which run in various directions. † The membranous septa are more numerous, and of greater thickness in some cases than others. There is occasionally mixed with this structure a cartilaginous substance. The whole structure sometimes resembles very much a piece of common cartilage, softened by maceration in a dissolving fluid. Cysts, containing a serous fluid, are sometimes formed in scirrhi, particularly those of the testicle and breast; but they are also frequently absent. A substance, possessing the common characters of a scirrhus, has been known to be converted into a kind of bony matter. ‡ When a section of a scirrhus is made in an early stage, the centre is found more compact, harder to the feel, and of a more uniform texture, than the rest of the tumour, and is nearly of the consistence of cartilage. This middle part is not larger than a silver penny; and from this are seen white ligamentous bands, passing to the

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* Obs. on Cancer by Sir E. Home, p. 156.

† The French, in their description, probably comprehend also the kind of structure noticed in the medullary sarcoma, fungus hæmatodes, &c. Their words are: "Parmi les tissus accidentels qu'on vient de nommer, il en est deux seulement, qui paraissent appartenir specialement, soit comme causes, soit comme effets, aux affections cancereuses; ce sont le *squirre* proprement dit; et la matière *encéphaloïde*, ou *cérébriforme*. On trouve toujours l'un ou l'autre de ces tissus, et quelquefois tous les deux ensemble, dans les tumeurs cancéreuses, quelque soit leur siége. Au contraire, les cinq autres tissus morbifiques ne s'y rencontrent qu'accidentellement; et lorsqu'ils ne sont pas unis à une quantité plus ou moins considérable des premiers, ils ne constituent point des tumeurs cancéreuses." See Dict. des Sciences Med. t. iii. p. 541.

‡ Dr. Baillie in a letter inserted in Adams's work on the Cancerous Breast.

circumference of the disease, in every direction, like rays.[*] In the interstices, between these bands, the substance is different, and less compact away from the centre. Transverse ligamentous bands, of a fainter appearance, are likewise perceptible, forming a sort of net-work, in the meshes of which the new-formed substance is enclosed.

When the disease is more advanced, the whole mass has a more uniform structure; no central point can be distinguished; the external edge is more defined; and the ligamentous bands are more visible, running with great irregularity.

When the disease has proceeded to cancerous suppuration, which, however, does not invariably precede the formation of an outward sore, a small irregular cavity is found, filled with a bloody fluid, and having ulcerated, jagged, and spongy sides. Beyond these there is a radiated appearance of ligamentous bands; but the tumour near the circumference is more compact, and consists of distinct portions, each of which has a centre, surrounded by ligamentous bands, in concentric circles.

In some instances, there is no appearance of suppuration, or ulceration, in the centre of a scirrhus; but a cyst is found filled with a transparent fluid, and having a fungus projecting into the cavity.[†]

The most characteristic mark of a scirrhus is this intersection of its structure with white ligamentous bands. It is to be regretted, that the existence of such texture cannot be detected till the disease has been removed. Every surgeon should be well apprised that these membranous septa frequently extend a good way into the surrounding fat; for, the circumstance dictates, in the strongest manner, the propriety of removing a considerable portion of the substance at the circumference of every scirrhous swelling.

Sometimes cysts, of moderate, or very minute sizes, containing a transparent fluid, and supposed by Dr. Adams to be hydatids, are found in the substance of scirrhi; but such cysts are not so frequently attendant on the complaint as to form any essential part of its character.[‡] The doctrine of the existence of hydatids in cancerous swellings is not confirmed by the reports, which have been made subsequently to those of Dr. Adams. Mr. John Burns * could never discern any thing in all the cancerous breasts, testicles, and other carcinomatous tumours examined by him, that could be positively called an hydatid; and he therefore supposes, that under this name have been described the little cancerous abscesses, with thick cartilaginous sides, so frequent in scirrhous glands. Cancer also may arise under conditions in which there cannot possibly be any hydatids concerned; for example, when a wart is torn off, and a cancerous sore is the result, the ulcer is only situated at the base of the excrescence, where there is never any hydatid. Himly † affirms, that he has never been able to detect in cancerous parts any thing like the existence of the animalcules in question; and Meckel ‡ makes nearly the same declaration.

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[*] Mr. Pearson expresses his belief, that this appearance is not peculiar to scirrhus, since he has seen a similar alteration in diseased breasts and testicles, where marks of scrofula existed. (P. 228.) But no doubt scrofula forms no protection from cancer, and a patient may suffer from both diseases.

[†] Sir E. Home, p. 157—159. Also Baillie's Morbid Anatomy; Abernethy's Surgical Works, vol. ii.; and Meckel's Handbuch der Pathol. Anatomie, Bd. 2. Abth. 2. p. 338.

[‡] Home, p. 160.

The dilatation of the superficial veins around scirrhous swellings is not peculiar to them; but is seen in many other descriptions of tumours.

OF CANCER IN THE STATE OF ULCERATION.

The diseased skin, covering a carcinomatous tumour, generally ulcerates before the swelling has attained any great magnitude. A large chasm is then produced in its substance, partly by a sloughing, and partly by an ulcerating process. A copious discharge of very fetid, sanious matter follows. The ulcer becomes irregular in its figure, and unequal on its surface. The edges are thick, indurated, and extremely painful; they often exhibit a serrated appearance, being sometimes retorted, at other times inverted. The ulcer sometimes spreads with rapidity to a great extent, and its progress produces frequent hemorrhages, which, joined with the irritation of the disease, reduce the patient to the lowest state of debility. Granulations generally grow on the ulcerated surface, when the ravages of the disorder seem to undergo a temporary stop; but this apparent attempt at reparation only ends in the formation of an inveterate fungous substance.

While the skin remains entire, without ulceration, the health is, in general, not much impaired, unless the tumour be very

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* Dissert. on Inflammation, vol. ii. p. 445. 8vo. Glasgow, 1800.

† Journ. der Praktischen Heilkunde von Hufeland und Himly. 1809. St. 12. S. 126.

‡ Handbuch der Pathologischen Anatomie, Bd. 2. Abth. 2. p. 355.

large, and the distention great. During the progress of the disease, some patients suffer distressing attacks of sickness and vomiting, with symptoms of indigestion. As soon as ulceration of a scirrhous breast happens, the alteration of the health is, in many cases, immediate. But this sudden change does not constantly happen, much depending on the quickness or slowness of the disease, its magnitude, &c. However, sooner or later, in every case, after ulceration has taken place, the countenance changes for the worse; debility, loss of appetite, a cough, with tightness of the chest, and difficulty of breathing, come on: the bowels are sometimes constipated, sometimes relaxed; and very distressing sickness and vomiting affect many patients, who at length sink into the extreme state of emaciation and weakness. *

The time when the lymphatic glands become affected, is subject to great variety. Carcinoma of the breast is most apt to contaminate the axillary glands, and the disease, in these last, sometimes causes a swelling of the whole arm. Occasionally, the lymphatic glands towards the clavicle are the only ones affected; and, in a few instances, those towards the sternum are alone diseased. In advanced cases, the disease mostly extends to the pectoral muscle. Instances are also recorded in which the cancerous disease of the breast extended to the pleura and lungs. † The pressure of a diseased lymphatic gland on one of the axillary nerves has been observed to cause most excruciating agony. A fever has been known to occasion a mortification of a cancerous breast, and, had the sphacelus embraced all the contaminated parts, and the patient been less reduced, it seems probable that a cure might have followed this event. ‡ The celebrated Mademoiselle Contat is said to have died suffocated by the tumefaction of the cellular substance about the throat, in consequence of an enormous cancer of her breast. §

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* Howard, p. 25.

† Hist. d'une Résection des Côtes et de la Pleùre lue à l'Acad. Royale des Sciences de l'Institut de France le 27 Avril, 1818, par le Chev. Richerand: in Nouveau Journ. de Médecine, Chirurgie, et Pharmacie, par Beclard, Chomel, &c. tom. 2. Mai, 1818. See also the account of a case which was in the Hôtel-Dieu at Marseilles, where "not only the whole breast was destroyed, but also the axillary glands, the surrounding cellular substance, the pectoral muscles, and some portions of the ribs; so that when the patient died, the pleura costalis, much thickened, formed the bottom of the ulcer in several places." See Dict. des Sciences Med. t. 3. p. 548.

‡ For cases proving the foregoing statements. See Obs. on Cancer by Sir E. Home, pages 55. 59. 64. 76. 86. 91.

§ Alibert, Nosologie Naturelle, ou les Maladies du Corps Humain distribuées par Familles, p. 543. fol. Paris, 1817.

TREATMENT OF SCIRRHUS AND ULCERATED CANCER.

The treatment of scirrhus embraces two objects; first, the dispersion of the tumour, or induration, by means of internal and external medicines, diet, pressure, &c.; secondly, the extirpation of the diseased parts with caustic, or the knife.

With respect to the dispersion of any truly cancerous tumour, or disease, in which the real scirrhous texture exists, I am decidedly of opinion with MM. Bayle and Cayol[*], that it is a thing which is never accomplished; and that if the benefit to be derived from an operation be put out of consideration, such disease is incurable, and for the most part fatal. The cases forming an exception to this general truth are said to be three. 1. Not only true scirrhi, but even ulcerated cancers, have been known to be so extremely slow in their progress that they have lasted an immense number of years, without having apparently contributed at all to the abbreviation of life. 2. Mortification, which is one of the occasional fatal terminations of cancer, may sometimes, though very rarely, prove a means of cure. MM. Bayle and Cayol have seen the whole of the tumour separated by the effect of gangrene, and the ulcer thus produced, speedily heal up like one of a simple nature. A remarkable example of this mode of cure has also been published by Garneri, principal surgeon of the Charité at Turin.[†] 3. Another event still more rare is the actual cicatrization of an ulcerated cancer, while the subjacent scirrhous mass has not been destroyed either by gangrene, or any surgical operation.[‡]

Most of the scirrhi, over which a cicatrix has been observed to form, are said to have a very particular structure, and may be considered as a distinct species. They are described as being dry and hard, like cartilage; and after attaining a certain size, they shrivel up; and the skin over them becomes puckered, with grooves and depressions, in which the nipple is sometimes considerably sunk. It is in this stage, that the ulcer, if it exist, may dry up and cicatrize. But while this hardening of the tumour is taking place, the patient suffers more or less severe internal pains, a kind of constriction of the chest, and a general unspeakable uneasiness. The swelling itself, however, is little or not at all painful. To these symptoms, a fever of bad type usually succeeds, and carries off the patient. Here, as MM. Bayle and Cayol observe, the ulcer is only an accessary symptom, of little consequence. When it exists, which is far from being constantly the case, the discharge from it only consists of a small quantity of ichorous matter; and its edges, instead of being turned outward like those of other cancers, are on the contrary drawn inwards; the part usually healing up before death. According to the expression of Pouteau*, who well knew the disease, such scirrhi are the most intractable of all. They break out after an operation in a more terrible form than what they previously exhibited; and they often destroy the patient by hectic or dropsy. When anatomically examined, they are found to consist of a homogeneous matter, hard, coriaceous, and much resembling the substance of a turnip cut longitudinally. The skin covering them, is dry, indurated, and sometimes studded with small scirrhous tubercles. The large varicose veins, seen round most other cancerous swellings, are not observable. MM. Bayle and Cayol acknowledge, however, that they have seen other scirrhi of a structure exactly like that above described, which continued for a long while in the breast, or other parts without pain, and without apparently shortening the lives of the patients. The afflicting symptoms mentioned above sometimes come on spontaneously; sometimes from the effect of injudicious treatment. These authors think, that the wisest conduct is not to meddle with scirrhi of this description, as we know of no means of curing, or palliating them with certainty, and experience has proved, that the mildest plans have but too frequently only rendered the disease worse.

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[*] Dict. des Sciences Med. t. 3. p. 554.

[†] Bulletin des Sciences Médic. par la Société Méd. d'Emul. Cahier de Dec. 1810, et Sep. 1811.

[‡] Op. cit. p. 555., and Obs. de M. Nicod in Bulletin de la Faculté, &c. No. 1. ann. 1810.

On the question, whether it be possible to disperse a really scirrhous tumour, that is to say one of the truly cancerous texture, to which I have adverted in the preceding pages, my own sentiments are in the negative. The very eminent Dr. Alexander Monro, senior, appears to me to have shewn that he had more discrimination than many of his contemporaries, when he gave it as his opinion, that the resolution of a cancer was a very rare occurrence; but that, as he had seen two swellings of this nature, or *at least what he supposed to be such*, cured, he would not take upon himself to deny absolutely the possibility of the thing.† It is not for us, as MM. Bayle and Cayol observe, to assign limits to the powers of nature;

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* Œuvres Posthumes, t. i. p. 164.

† Edinb. Med. Essays, vol. v. art. 32.

and, therefore, it would be unphilosophical to assert, that the resolution of a cancer is utterly impossible; but as we cannot find a single well-authenticated example of it amongst several thousands of cases, we have a right to affirm, that such a termination of the disease is not in the natural course of things, and that we should act, just as if the occurrence were altogether impossible. *

When the hardness is so situated as to be easily removed by the knife, no delay should be occasioned by attempting to disperse a swelling of this nature. The operation ought to be performed early, as the chance of effectual extirpation is then greatest. The means, employed in the endeavours to disperse a true scirrhus, are tedious in their operation, often injure the health, and when of an irritating nature, and incautiously applied, convert the scirrhus into a cancer. Prudence will only allow the operation to be postponed, and discutient remedies tried, when doubts exist as to the disease being a true scirrhus, with the peculiar textures already described.

There are various diseases of the breast, which somewhat resemble cancer; and besides encysted tumours, and different sarcomatous swellings, mentioned in a former chapter, surgeons frequently meet with other diseases of the breast, which may be mistaken not only for an indolent scirrhus, but even for the painful form of this complaint, and ulcerated cancer itself. If the true nature of such cases be not ascertained, which is often very difficult and sometimes impossible in the living subject, we may think, that when we are treating only a simple chronic inflammation, or some other benign form of disease, we are treating a really cancerous complaint, and ascribe to the virtues of the medicines a cure, which would frequently be produced by nature alone. These mistakes have had as much influence, as credulity and quackery have had, in conferring a temporary reputation upon all the specifics which have hitherto been proposed for cancer. Hence, the necessity of enquiring into the nature of the cases, which may resemble the latter formidable complaint; a subject, without some knowledge of which no surgeon can be qualified to judge of the propriety, or impropriety, of attempting to disperse and cure the disease, without an operation.

1. In women, one breast is often rather larger and more tender than the other, especially about the period of the menses. When in such persons, this evacuation is by any cause considerably checked, or suppressed, one or more indu-

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* Dict. des Sciences Med. t. 3. p. 556.

rations, resembling scirrhi, may form in one or both breasts, and continue long enough to create alarm. Such swellings may be resolved by means calculated to re-establish the menstrual evacuation, and by the use of narcotic applications. Mercatus and De Houppeville* are said to have given a very good description of this slight complaint.

2. Swellings of a similar appearance sometimes form, without any perceptible cause, in the course of the lymphatic vessels, which pass from the breast to the axilla. From being at first slightly painful, they may become indolent, and continue in this state several months. Several alterative medicines, the warm bath, fomentations, and narcotic applications will generally cure this form of disease. When the patient is plethoric, bleeding may also be useful. But should these remedies be ineffectual, and the little lumps, instead of diminishing, become harder and harder, and remain at the same time perfectly indolent, we are recommended to try the compound decoction of sarsaparilla, the occasional employment of mild purgatives, and mercurial frictions in the course of the absorbents, which pass to the tumefied glands. †

3. A blow on the breast, long-continued pressure, or the frequent handling of the part, may give rise to swellings of it, which are more or less considerable, according to the intensity of the cause, and the sensibility of the individual. These swellings which are only simple acute, or chronic inflammations, sometimes become hard and irregular, so as to be liable to be mistaken for cancer; and their cures reported as instances of the successful treatment of this other disease. The learned Van Swieten has fallen into such an error ‡ himself. How many surgeons have been seen acquiring great reputation by the extirpation of swellings of this nature, which would have been cured by time, and a few simple remedies? Vacher relates, that in 1732 one of these intrepid operators threw the women of Besançon into consternation; nearly all of them fancied they had discovered in their breasts hardnesses, which had been occasioned by the handling of the parts, and many of them were foolish enough to submit to an unnecessary operation. The others who were wiser, and listened to Vacher's advice, saw their pretended scirrhi disappear spontaneously. §

4. In consequence of acute inflammation of the breast, which has terminated either in suppuration or resolution,

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* La Guérison du Cancer au Sein, 12mo. Rouen, 1693, p. 75.

† Dict. des Sciences Med. t. 3. p. 557.

‡ Comment. in Aphor. § 490.

§ Vacher, Diss. sur le Cancer des Mammelles, 12mo. Besançon, 1740.

there often remains a deep-seated, uneven hardness, which, when irritated by any accidental cause, becomes painful, of a livid red colour, and so like an occult cancer as frequently to be mistaken for it. These are the kinds of cancer which are alledged to have been cured by bleeding, the repeated application of leeches, emollient and narcotic applications, low regimen, &c. One of the principal characters, (say MM. Bayle and Cayol,) by which the previous cases may be detected, is, that they are all of them more or less painful on being handled; while a true scirrhus is not so, not even at the period when the lancinating pain has begun in it, provided it be uncomplicated with an attack of inflammation.*

5. The breasts are subject to swellings of a scrofulous nature, which at first bear a resemblance to indolent scirrhi, and afterwards to ulcerated cancer. They are said particularly to occur between the age of puberty and the thirty-sixth year, and in women, who, though not evidently scrofulous, have thick lips, broad flat noses, &c. M. Bayle has often seen such swellings, with and without ulceration, cured by tonics, the extract of conium, the alkalies, and other anti-scrofulous medicines, after the disease had continued more than a year. When the swelling was very painful, emollient poultices were applied, and sometimes camphorated liniment. The ulcers, originating from these swellings, sometimes present thickened everted edges; their circumference is of a lead-coloured, or reddish hue; the veins seem dilated, and their surface exhibits fungous granulations. In short, they are the strongest likenesses of ulcerated cancer. The age and constitution of the patient; an attentive enquiry into the nature of the pain, discharge, &c., will throw some light upon the diagnosis, and all doubts will soon be dispelled by the good effects of anti-scrofulous remedies.

6. Swellings of the breast, of longer or shorter duration, and which originate very soon after delivery, in consequence of a milk abscess, or inflammation, are named *milk-scirrhi;* but even when such tumours are as hard and firm as real scirrhi, they are commonly nothing more than chronic inflammations, arising in individuals, whose constitutions are somewhat influenced by the state of the secretion of milk. Experience also proves, that they may generally be successfully treated by exhibiting the compound decoction of sarsaparilla, and employing resolvent remedies. When, however, they de-

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* Dict. des Sciences Med. t. 3. p. 558.

generate into true cancerous tumours [*], they should not be named milk-scirrhi, because both in their structure and symptoms they are precisely like other scirrhi.

7. Herpetic diseases on the breast, or its vicinity, often cause indurations in the interior of this organ, at the circumference of the mammary gland. These hardnesses are the more like scirrhi, because, in some cases, the patients complain of feeling pains, which are compared to the pricks of needles, or the cuts of a penknife. When, however, the proper remedies for herpes are prescribed, the swelling subsides, and finally disappears altogether. Here the compound decoction of sarsaparilla, the pil. hydrargyri in small doses, an issue in the arm, with the ung. sulphuris, hydrarg. nitrati, or carrot poultices, as local applications, will frequently be found effectual.

8. Persons afflicted with rheumatic pains, and wandering gout, have sometimes hard swellings in their breasts, of either an indolent or painful character. These diminish under the use of means calculated to relieve the constitutional affection, and entirely disappear on the gout or rheumatism attacking any of the joints. [†]

When we consider the many diseases which may more or less resemble cancer, and reflect upon the great varieties to which the latter disease itself is subject, in respect to its origin, progress, symptoms, &c., we must soon see how difficult the diagnosis must often be, and what little confidence should be put in all the alledged cures of pretended cancers, which are either not described at all, or but very insufficiently. Hence we also see, why the most skilful surgeons are obliged to own, that they are not sure of ever having cured a single cancer, while charlatanical practitioners are said to achieve wonders in this way every day!

The following are the medicines which have been most extensively recommended and tried in cases of cancer.

1. Hemlock, or conium maculatum, was most highly recommended by Baron Storck [‡]. Two grains of the extract were given at night and in the morning, and the doses were sometimes gradually increased, till the patient took as much as a dram and a half or two drams in the day. The very circumstance of all Baron Storck's cases being represented as cures, might alone have raised suspicions as to the accuracy of his accounts,

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[*] Fabricius Hildanus Centur. 2. Obs. 78.

[†] Bayle et Cayol in Dict. des Sciences Med. t. 3. 556, &c.

[‡] Libellus de Cicuta, Vindob. 1760.

had not his high reputation operated as a pledge of the truth of his assertions. Subsequent experience has proved, however, that Baron Storck erred, as a great many other eminent men have done, in consequence of his having confounded diseases with cancer, which were in reality of another nature. He saw diseases get well, which he *supposed* to be cancerous, and he ascribed every thing to the medicine. In opposition to Storck's evidence, Dehaen declares, that out of 120 cancerous patients, who, to his knowledge, had tried conium, not a single one was cured; and of eight women with cancers of the uterus, to whom he himself administered hemlock on Storck's plan, not one obtained a recovery. Fothergill, Akenside, and Kirkman, in England; and Bierken, in Sweden, reaped no better success from the exhibition of conium. Most of these writers, however, acknowledge its usefulness in resolving scrofulous, and some syphilitic indurations. Such was also the opinion of *Cullen. Lastly, Dr. Alibert, now physician to the hospital of St. Louis, at Paris, has tried Storck's plan on more than 100 women afflicted with ulcers of the uterus, and other cancerous diseases, without finding the least benefit result from it. † MM. Bayle and Cayol are a degree more favourable than their countryman Alibert; for, though they fully concur in the inability of hemlock to cure scirrhus and cancer, they believe that it sometimes renders the progress of these diseases slower and less painful. In other instances, however, where it produces irritation, these authors describe its effects on cancer as pernicious. ‡

2. Lambergen, professor of physic at Groningen, used to exhibit in cancerous cases an infusion of the leaves of belladonna; and, of late, the extract has also been extensively tried. Belladonna is generally allowed to have much the same virtues as conium, in cancerous diseases, sometimes benefiting complaints resembling cancer, and even occasionally retarding the progress of true scirrhi and carcinomatous ulcers. The same report may be made respecting aconitum, the aqua laurocerasi, and fennel-water.

3. Acetite of copper is the principal ingredient in the remède de Gerbet, and Gerbier's pills, two famous nostrums in France, for cancerous swellings and ulcers. Dr. Mitag-Midi,

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* Materia Med. part. ii. chap. 6.

† Dict. des Sciences Med. t. iii. p. 662. Nouv. Elém. de Therap. t. i. p. 425. Alibert Nosologie Naturelle, &c. t. i. p. 558.

‡ Dict. des Sciences Med. loc. cit.

a respectable physician there, who was even at first prejudiced against preparations of copper, is said to have seen the acetite cure cancer in numerous forms. Probably, however, he confounded other diseases with real scirrhi and carcinoma, for it appears from the report of Dr. De la Romillais [*], who was appointed by the faculty of Paris to enquire into the true claim of the acetite of copper to being a remedy for cancer, that this medicine produces no good effects in such cases; but that some instances of noli me tangere (lupus) got well while the patients were taking it. Whenever the doses were increased to above 10 or 12 gr. oppression at the præcordia, colic, obstinate diarrhœa, vomiting, &c. were induced.

4. Arsenic was proposed as a certain cure for both occult and ulcerated cancers, by M. Lefebure de [†] St. Ildefond. His preparation was white arsenic, or acid of arsenic, of which four grains were dissolved in a pint of distilled water. Of this solution, the patient took at first every morning one table-spoonful, in an equal quantity of milk, sweetened with syrup. At the end of a week, if no unpleasant effects had arisen, a second dose was given every evening, and, after a fortnight, three doses were taken every 24 hours. When the first bottle had been exhausted, another was prepared with six grains of the arsenic, and the third bottle, which was the strongest ever used, contained eight grains. The ulcer was also bathed, and washed with a liquid composed of 8 grains of arsenic, in a pint of distilled water, and afterwards covered with a poultice made with carrots, which had been boiled in a similar solution, to which the acetite of lead, laudanum, and the extractum conii had also been added in various proportions. This author assures us, that he had by these means cured thirty confirmed cancers, in the course of fifty years' experience. Justamond's reports were also highly favourable to arsenic, as a remedy for cancer. [‡] On the other hand, Acrel in Sweden, Metzer in Prussia, B. Bell in Scotland, Mr. John Pearson in England [§], and Desgranges, of the Hôtel-Dieu at Lyons, in France, have not found arsenic capable of curing cancer, while its deleterious effects have in

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[*] Séance Publique tenue par la Faculté de Méd. le 5 Nov. 1788. 4to. Paris, 1779.

[†] Remède éprouvé pour guérir radicalement le Cancer, &c. 8vo. 1775.

[‡] An Account of the Methods pursued in the Treatment of Cancerous and Scirrhous Disorders, &c. 8vo. Lond. 1780.

[§] Principles of Surgery, p. 277. edit. 2.

many instances compelled the surgeon to discontinue it. The arseniates of potassa and soda are now considered the safest preparations of arsenic for internal use. We see, however, that there is little reason to expect any good from it in really cancerous diseases, though the testimonies are certainly very strong in favour of its good effects in some resembling complaints, and particularly in cases of lupus, and other inveterate ulcerations of the skin and lips. *

5. Preparations of iron were strongly recommended by Mr. Carmichael, of Dublin. † He employed the carbonate, the oxyphosphate, and suboxyphate of this metal, in doses of from 30 to 60 grains in the day, aloes being given to obviate costiveness. He also used the carbonate as a topical application. Five cancerous ulcers of the face are reported to have been thus cured. It would have been more satisfactory, had these cases not been reputed cancers of the face, diseases which are in reality generally, if not always, very different from specimens of the true scirrhous, or carcinomatous structure. We know that many of these affections are only instances of lupus, or noli me tangere, and that, in their worst forms, they will often yield to the external and internal use of arsenic, conium, and other alterative plans, such as the compound decoction of sarsaparilla, with Plummer's pills, &c.

6. Preparations of mercury have so often been tried and found ineffectual for true scirrhous and cancerous diseases, that little need be said about them. Mercurial frictions, we well know, are amongst the best means for dispersing most indolent swellings, which admit of resolution. They also produce a change in the system, which, like any other alterative, will frequently make obstinate and troublesome sores heal. These are the effects which are the foundation for the notion, that some really cancerous affections have been cured by mercury. Mr. Andrew Wilson, in praising a solution of the oxymuriate, fumigations with cinnabar, &c. as remedies for cancerous sores of the skin, was probably only led to do so from the effects which he saw produced by such treatment, upon ill-conditioned ulcers, which were in reality of another nature. "The exhibition of mercury (says a modern surgeon) will commonly exasperate the disease, and is certainly no antidote." ‡

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* See Klein's Chirurgische Bemerkungen, p. 264.

† Essays on the Effects of Carbonate and other Preparations of Iron upon Cancer, 2d edit. Dublin, 1809.

‡ Pearson's Principles, p. 277. edit. 2.

7. Muriate of barytes was proposed by Dr. Crawford; of his three cases, however, only one is allowed to have been cancerous: it was a cancer of the penis, which, notwithstanding some temporary appearance of improvement from the medicine, ultimately proved fatal. The other cases are considered by MM. Bayle and Cayol to have been in reality scrofulous. Pinel and Alibert also confirm the inefficacy of of the muriate of barytes in cancer. *

8. Repeated bleeding has been highly recommended, as a means of curing cancer in particular, by Valsalva † and Fearon. ‡ The latter applied leeches every two or three days, unless the bites caused too much irritation, and he used also the cold lotion of the acetite of lead. In cancerous affections of the uterus, and internal organs, he practised venesection, and, he assures us, that repeated bleedings always have the effect of lessening the pain in the latter stages of disease, when opium and hemlock will give no relief. Of the utility of general and topical bleeding, when true cancerous diseases are complicated with common acute or chronic inflammation, no doubt can be ascertained; but experience will not warrant the conclusion, that they have the power of curing either a true scirrhus or cancer. All alledged cures of this kind have in truth been cases of another nature. According to an experienced surgeon, tumours arising from cold yield most readily to the repeated use of leeches, while those which are more indolent, and connected with a languid constitution, give way to hemlock or mercury. §

9. Living altogether on milk, or on a regimen just sufficient to support life, has been found to retard the malady. A strict vegetable diet, the avoidance of fermented liquors, and the use of nothing but distilled water in every thing which is taken as drink, were proposed a few years ago. || M. Pouteau ¶ long since imagined that he had radically cured several

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* Dict. des Sciences Med. t. iii. p. 665.; Nouv. Elém. de Therap. t. i. p. 498. Nosologie Naturelle, p. 558.

† De Sed. et Causis, Morb. Epist. 39. art. 35.

‡ Treatise on Cancers, with an Account of a New and Successful Method of Operating, &c. 8vo. Lond. 1786. This novelty consisted in the plan of bringing the sides of the wound together, and healing it by the first intention. The principles which Alanson applied to amputation, Fearon extended to operations for cancer.

§ Sir E. Home on Cancer, p. 154.

|| See Lambe's Reports on the Effects of a peculiar Regimen on Scirrhous Tumours, &c. Abernethy's Surgical Works, vol. ii. Classification of Tumours, p. 93.

¶ Œuvres Posthumes, tom. i.

cancers, by giving the patients no food, except six pints of ice-water in the four-and-twenty hours. At the end of three days, he tells us, that these patients lost all their appetite, and could bear the privation of food without difficulty. Some of them are reported to have lived fifty days, and even two months, without taking any thing but common water. When the breath was foul, and the tongue furred, Ponteau used to prescribe two or three drams of magnesia to be taken in the morning. After this rigorous plan had been followed about two months, food was given again very gradually, the patient beginning with the yolk of an egg dissolved in two glassfuls of water, and afterwards venturing upon custards, soup, and, at length, solid aliment. But, as MM. Bayle and Cayol observe, when Pouteau's cases are candidly considered, it appears that he only effected the cure of some ordinary chronic swellings. * The operation of severe abstinence in exciting the action of the absorbents in the removal of indolent tumours, is generally acknowledged; and it is strikingly illustrated in the instances, in which the diminution of enormous portions of protruded omentum has been thus accomplished.

10. With respect to opium, which has at different periods been cried up as a remedy for cancer, I shall only observe, that at present its utility is limited to alleviating the pain and misery of cancerous diseases, and procuring rest.

11. Various mineral waters, blisters, and issues † are mentioned by writers; but their power over cancer is not much credited.

From these remarks on some of the chief internal medicines which have been proposed for the cure of scirrhi and cancers, I proceed to the consideration of topical remedies.

1. Arsenic put on cancerous ulcers acts as a caustic, and destroys the parts. Fusch is said to have been the first who employed arsenic in this way, in the year 1594. He sprinkled on the sore a powder composed of white arsenic, soot, and snake-root. ‡ In a few days all the ulcerated surface was converted into an eschar, on the separation of which an ulcer was sometimes left, that was capable of being cured. But, in other examples, the application of arsenic brought on dangerous febrile symptoms, with shivering, vomiting, syncope, &c. so that its use could not be continued. Fernel tells us of a woman who had a cancer of her breast, to which a mixture of

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* Dict. des Sciences Méd. t. iii. p. 667.

† Flajani, Collezione d'Osservazioni e Riflesscioni di Chirurgia, t. i. p. 275.

‡ Houppeville, Guérison du Cancer, p. 174.

arsenic and corrosive sublimate (oxymuriate of mercury) was applied: she died in six days, with symptoms indicating that she had been poisoned. With a view of preventing such disasters, arsenic has therefore been generally mixed with other less deleterious ingredients, such as dragon's-blood, cinnabar, &c. These compositions, when they are used, are often moistened, and made into arsenical pastes. Modern surgeons seldom venture to apply arsenic to true carcinomatous ulcers, because its irritation is sure to do infinite harm, unless the whole of the diseased parts admit of being destroyed by it, which rarely happens. If the parts are to be extirpated, the knife is the surest, safest, quickest, and least painful means. If, however, arsenic is not to be advised as a topical application for true cancers, it deserves trial in cases of lupus or noli me tangere, and other superficial supposed cancerous ulcerations of the skin, especially on the lips, and other parts of the face.

2. The remarks on the topical use of arsenic may be extended to all caustics and escharotics, and even to the actual cautery itself. The caustic potassa, the nitrous and sulphuric acids, the nitrate of silver, &c. can only cure cancer on the principle of a complete destruction of the diseased parts; a plan which is always uncertain of accomplishment, and if not completed, must dangerously aggravate the disease. I have seen several patients die in the course of four or five days, in consequence of the violent indisposition brought on by the application of caustics to cancerous and other anomalous diseases.

3. The liquor plumbi acetatis alone, or mixed with laudanum, spirit of wine, and camphor, has been often used with alleged success. The late Mr. Ramsden often applied it to indolent swellings of the breast; but most of the cases which I saw successfully treated by him in this way, were certainly not real scirrhi. Sir E. Home adds his testimony, however, in confirmation of the application sometimes actually dispersing tumours which resemble scirrhi.* The employment of the diluted liq. plumbi acetatis, and leeches, by Mr. Fearon, has been already noticed.

4. Opium, cicuta, belladonna, and other narcotics, have been extensively tried as topical applications, in the form of plasters or laudanum, to scirrhi; and of laudanum, lotions, fomentations, and poultices to ulcers. With the exception of laudanum for sores, these narcotics are, perhaps, nearly as safe as any dressings which can be used, because they are not

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* On Cancer, p. 154.

likely to create irritation. M. Steidele * supposed it possible to cure both ulcerated and occult cancers by the long-continued application of compresses dipped in laudanum, provided the patients were not too old, and their viscera were sound. But, as MM. Bayle and Cayol remark, the only case which he has adduced to prove the efficacy of the remedy, was an instance in which a cancer of the breast was in fact cured by a spontaneous mortification, which destroyed the whole of the diseased parts. †

5. The carrot poultice is one of the safest dressings for cancerous sores. It was first recommended by Sultzer, in 1766, physician to the Duke of Saxe-Gotha. It has been employed these many years past in England; and a work was not long ago published in France on the medicinal virtues of the carrot. ‡ Though an eligible dressing for cancerous ulcers, it has not the power of curing them. However, it has even this effect upon many scrophulous, ill-conditioned, anomalous sores.

6. Preparations of iron have been of late praised as topical applications; viz. a solution of the sulphate of iron, ℥j to ℔j of water, or covering the surface of the sore with a paste made of arseniate, or carbonate of iron § moistened with water. It is far from being proved, however, that these applications have answered, except for phagedenic ulcers, cases of lupus, &c.

7. Amongst a great variety of topical remedies which have been suggested, but not found effectual, I shall only mention the following: the fresh bruised plant of the house-leek ‖; the juice of the berries of the phytolacca americana, or the extract ¶; a mixture of ℥ss of the juice of digitalis in ℔j of water **; the gastric juice of animals ††; fermenting poultices; olive oil; various discutient plasters; electricity.

8. The long-continued application of cold running spring water to the part. ‡‡

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* Journ. de Méd. t. lxxii.

† Dict. des Sciences Méd. t. iii. p. 658.

‡ Bridault, Traité sur la Carotte, 8vo. 1802.

§ Carmichael, Essay on the Effects of the Carbonate and other Preparations of Iron on Cancer, &c. 8vo. Dublin, 1809. Edit. 2.

‖ Quesnay, Traité de l'Art de guerir par la Saignée; Lombard, Récueil Périodique de la Soc. de Méd. t. xxviii.

¶ Annales Cliniques de Montpellier, t. xxv.

** Actes de la Soc. de Méd. de Montpellier, t. i.

†† Gilibert, Obs. Importantes sur le Suc Gastrique, &c.

‡‡ Allbert mentions a cancerous ulcer of the foot, which had its nature entirely changed by exposing the part, for very long periods together, to the stream of a cold spring. The same author, after reporting this instance of

9. Whatever doubts may be entertained about the prudence of venturing to try several of the local remedies to which I have adverted, all surgeons now seem to agree about the propriety of retaining a scirrhus in an equal temperature, and as much as possible defended from accidental violence. With these views, it is usual to advise patients to keep the swelling covered with a piece of swan's-down, or rabbit's-skin.

10. Desault had an idea of trying pressure as a means of curing cancer; but never put the plan in practice. An English surgeon [*], however, some years ago, made an actual trial of what is termed methodical pressure, and published a series of observations highly recommending it. As a late author observes, the only essential part of this new plan is the compression of the cancerous tumour, gently at first, and with a force gradually increased, till at last it is augmented to a very great degree. If the cancer be open, the cavities are filled up with finely levigated chalk, and all the surface thickly covered with hair-powder, over which long straps of plaster are put so as to cover the whole surface of the tumour. Compresses are then laid on, and the whole firmly bound down with a long roller; or over the first straps are laid a second set, bracing the parts more firmly than the first; next a plate of lead; and lastly a roller carried round the chest. With respect to the merits of the plan, it appears from late impartial investigations at the Middlesex Hospital, that the specific action of cancer is not subdued by pressure, and that it accelerates the coming

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success, proceeds to a very ludicrous description of an hydraulic machine, which he invented for applying a stream of cold water to the scirrhous uterus of a young opera dancer. "C'étoit un réservoir placé à un certain hauteur dans l'appartement de la malade. De la partie inférieure de ce reservoir partoit un tuyau de cuir très-flexible, à l'extrémité duquel s'adaptoit une petite canule terminée en arrosoir. Cette canule, introduite dans le vagin, y déposoit un eau narcotique, qui stupefioit à la longue le col si irritable de l'organe utérin. Cette eau, devenue impure, tomboit ensuite dans un bassin placé sous la malade, lequel étoit percé d'un second tuyau conducteur, qui la transmettoit à une distance plus ou moins eloignée. Il est utile de consigner ici, que la jeune femme, dont je viens de parler, se soumit *pendant cinq années consécutives,* au traitement pénible, dont il s'agit. Comme les soins de propreté etoient pour elle un objet d'étude constante, *elle avoit trouvé l'art de masquer, par une tapisserie élégante, l'appareil qui servoit à l'administration des ses douches! Le tuyau venoit en quelque sorte la trouver furtivement sous un large piano qu'elle avoit devant elle, et qui servoit à charmer ses ennuis! Souvent même, pour varier ses distractions, on pouvoit substituer à l'instrument musical un table de jeu!* &c." The result was, that the young female at last suffered no inconvenience, but sterility! See Alibert's Nosologie Naturelle, &c. p. 561.

[*] Minutes of Cases of Cancer and Cancerous Tendency, successfully treated by Samuel Young, 2 vols. 8vo. Lond. 1816—1818.

on of the last fatal symptoms. "It frequently gave so much pain, that the patients could not, after repeated trials, endure it, under any modification whatever; and often it appeared to hasten the fatal event." We learn, "that in the scirrhous tumours, the disease advanced, rendering extirpation necessary in two instances; in six others, the disease passed into ulceration, assuming the usual malignant appearances, and terminating in death." * Here the opposite accounts, delivered by the proposer and the latter author, are to be reconciled by supposing that the former must have been deceived, with respect to the real character of the diseases which he reports to have been cured by pressure. The very expression "of a cancerous tendency," adopted in the title-page of his work, implies a very great latitude, such as is not admissible in investigating the actual power of any remedy over true carcinomatous affections.

As then we possess no remedies for truly cancerous diseases, the extirpation of them with caustics, or the knife, is the only thing which offers any chance of cure. The first of these plans is justly discountenanced by every prudent surgeon, because the process is exceedingly painful, often ineffectual from the whole of the diseased parts not being destroyed, and not unfrequently productive of a fatal aggravation of the distemper. Even when the parts are completely destroyed with caustic, the method sometimes creates such a degree of irritation, as is sure to be followed by the most dangerous disturbance of the constitution. I shall only say further, therefore, respecting the use of caustics, that they are perilous applications in cases of scirrhi and cancer, and that they are seldom employed, except for complaints which go under the name of noli me tangere, or lupus, in which instances the nitrate of silver and arsenical pastes and lotions are occasionally made use of with advantage.

In other examples of truly scirrhous and carcinomatous affections, the removal of the whole of the diseased parts with a knife, when they admit of being thus entirely cut away, is the measure by which the patient is sometimes fortunate enough to be permanently relieved. Many delicate and difficult considerations occur, however, in this part of practice. In most cases, the whole of a cancerous breast can be completely removed; the operation is neither difficult nor dangerous in itself; the wound resembles any other simple wound; and it generally heals up very well. But, unfortunately, in a certain proportion of cases, the disease, sooner or later, recurs

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* Surgical Obs. by C. Bell, vol. i. p. 4—11.

in the same or some other part of the body, and, as some writers urge, generally in a much more violent form than before the operation. Hence many eminent men, of ancient as well as modern times, consider the use of the knife, in cases of cancer, as useless and hurtful.[*]

But it cannot be doubted that the writers to whom I have referred, have carried too far their mistrust in the resources of surgery; and, as MM. Bayle and Cayol remark, De Houppeville himself, who condemns the operation, seems to have succeeded by this means in curing four women who were afflicted with occult or ulcerated cancers; and many similar cures are upon record, in some of which the patients remained perfectly free from the disease, at periods exceeding twenty and thirty years after the operation.[†] If, however, we suppose, with MM. Bayle and Cayol[‡], (as I think we are bound to do,) that amongst these and other histories of the same nature, some of the tumours extirpated were not really cancerous, we cannot reasonably extend this opinion to the whole of the cases in question; and the number to be regarded as true scirrhi is still large enough to shew the impropriety of an absolute rejection of the operation.

The accuracy of the three following propositions laid down by MM. Bayle and Cayol, appears unquestionable. 1. After the extirpation of a scirrhous tumour, whether the disease be indolent or painful, or small or recent, there is no certainty that the disease will not recur. 2. Neither is it certain that the disease will return, even when it has made considerable progress. 3. The more recent the disease is, the less the chances are of relapse.

As soon therefore as a tumour is considered to be a real scirrhus, the earlier the operation is performed the better. We know of no other plan which holds out as good a prospect of relief, and though not exempt from the possibility of failure, it frequently succeeds.

A few exceptions to the foregoing rule are pointed out by surgical writers.

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[*] Hippocrates, Aphor. 38. Sect. 6.; Celsus de Re Med. lib. 5. cap. 28.; Mercatus de Commun. Mulier. Affect. lib. 1. cap. 17.; Triller, De Nocivâ Cancri Inveter. Extirp., Witteburgi, 1752; A. Monro, Edinb. Med. Essays, t. v.; De Houppeville, La Guérison du Cancer au Sein, 12mo. Rouen, 1693.

[†] Vacher, Diss. sur le Cancer des Mamelles, p. 119—174, 12mo. Besançon, 1740; Mém. de l'Acad. Royale de Chirurgie, t. iii. p. 25—40; Sabatier, Médecine Operatoire, t. ii. p. 355. edit. 1. Unzer, Gazette Salutaire, Mars, 1791. Hill's Cases in Surgery, 8vo. Edinb. 1772.

[‡] Dict. des Sciences Méd. t. iii. p. 567.

The indurations which form in the breast, immediately after the cessation of the menses, or at a more advanced period of life, it is said, should not always be extirpated; since many aged females have had such swellings a considerable number of years, and even to the end of their lives, without experiencing any harm from them. * A lady, fifty years of age, requested Vacher to remove from her breast a tumour which she had had for four years, and began to form at the cessation of the menses. The swelling was about as large as a walnut, hard, and quite indolent. Vacher dissuaded the lady from the operation; enjoined her to use no topical applications; prescribed a low regimen for her; and occasional bleedings. By these simple precautions the swelling was kept so stationary, that at the end of seventeen years, Vacher found it precisely in the same condition as when he first saw it. † The same author assures us that he has thus treated, with equal success, many women of advanced age, and, more particularly, several nuns who had tumours in their breasts.

With respect to these indurations, which remain so long stationary, MM. Bayle and Cayol have ascertained by dissection, that they are sometimes true scirrhi, and sometimes sarcomatous tumours of another nature. They are also alleged to be more frequently met with in old maids, than in women who have had children. ‡

It does not appear to me that these first exceptions to the rule of proceeding to the operation without delay, ought to be allowed to have much influence in practice, until the cases can be better defined. Were we to feel ourselves authorized to defer the operation, on account of the tumour having originated at the periods of life here specified, we should of course include a vast number of true scirrhous tumours, which are allowed to occur with particular frequency in women after a certain age. The indolence of the swelling may be a better reason for delay; but yet as it is universally admitted, that a chronic scirrhus may suddenly change to a worse form, and the more recent the disease is, the greater the chances are of the operation affording a radical cure, I am disposed to think the timely employment of the knife the best practice.

Another exception, specified by surgical writers, seems less doubtful: viz. when the same patient has several cancerous affections, an event which is very unusual. I cannot agree,

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* Acad. Royale de Chirurgie, t. iii. p. 20—22.

† Diss. sur le Cancer des Mamelles, p. 88.

‡ Dict. des Sciences Méd. t. iii. p. 569.

however, with some French writers, that the circumstances of being descended from cancerous patients, and of an age above forty, conjoined with irregularity of menstruation, are adequate reasons for declining to operate.

Dr. Alexander Monro, senior, was adverse to undertaking operations for such cancers as had arisen spontaneously, without any external cause, because these cases were considered particularly liable to relapse. Of late years, however, an unlimited belief in a cancerous diathesis has considerably declined, and few practical surgeons of the present day are deterred from operating, merely because the disease had not proceeded from manifest external causes.

When the extent and situation of the disease are such as to render the removal of the whole of the morbid parts impracticable, the operation, of course, must not be attempted. The partial extirpation of a true scirrhus, whether by caustic or the knife, is sure to convert the distemper into a malignant ulcerated cancer, and hasten the patient's death. Without an entire removal of all the diseased parts, there is no chance of success; and, therefore, in no operation is celerity more dangerous. Here, indeed, the maxim of "*sat cito, si sat bene*" should never be out of the surgeon's mind. Above all things, a free removal of the skin covering and adjoining a scirrhus, and taking away a quantity of the surrounding fat, are highly advisable.

Sometimes, however, notwithstanding all possible precautions to cut away every particle of the disease, the wound, instead of healing up, changes into a cancerous ulcer. Every prudent surgeon, therefore, should ensure his own reputation by making a guarded prognosis.

When the axillary glands are diseased, the surgeon is to proceed to remove them, as soon as he has taken away the scirrhus of the breast. A fact, however, to which I have already adverted, merits attention; viz. cases have occurred, in which the axillary glands, though very much enlarged and indurated, were not in a scirrhous state; but merely inflamed from irritation. * In such examples, Louis, Desault, † Klein, Assalini, and ‡ Soemmering have successfully extirpated cancerous breasts, without removing the axillary glands. As, however, it is scarcely possible to know beforehand, whether the glands are simply inflamed, or truly cancerous, we should undoubtedly make it an invariable rule to take away all such as are swelled and hardened. After the removal of a cluster of diseased glands from the axilla, a swelling of the arm has been known to ensue, and cause the patient's death.* Camper believed that a sure sign of the incurability of a cancerous breast, consisted in a shooting pain between the second and third ribs, at the place where the mammary vessels quit the cavity of the chest. He was persuaded, that, when such pains commenced, the cancerous distemper had extended to the lymphatic glands underneath the sternum, which have a communication with both breasts by means of absorbent vessels, and, therefore, he deemed the operation too late. In opening women who had had a breast removed, and some of whom lived till the wound was quite healed, Camper found the glands under the sternum changed into cancerous excrescences, which had already made their way through the intercostal muscles, and formed a projection beneath the integuments. No man would be justified, I think, in imitating Richerand, who, as we have already observed, ventured in one case even to cut away a part of the ribs and pleura costalis itself. The poor patient was trebly remarkable; first, on account of the extraordinary ravages of the disease; secondly, because his case was an instance of a cancerous breast in a male subject; and, thirdly, because he was himself a surgeon, capable of judging of the dangerous nature of the operation to be done upon him. Richerand, in his haste to communicate the history of this formidable excision to the Royal Institute of France, was rather too sanguine in his description of the success which was likely to follow the proceeding; for hardly a month more had elapsed, before tidings arrived of the patient's decease.

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* Vacher, op. cit. p. 134—171; Zinn, in Comment. Societ. Gotting. t. i.

† Chir. Bemerkungen.

‡ De Morb. Vasorum Absorbentium.

In ulcerated cancers, the chances of a cure are less than in cases of scirrhus. However, when the patient is not too far reduced, and the whole of the diseased parts can be taken away, the operation will yet sometimes answer. We may generally entertain a rational hope of this success, when the ulcer is not of long standing, not extensive, nor the pains severe and lancinating. There are examples in which we find high authorities in justification of the operation, even when there is little or no reason to expect the avoidance of a relapse. Thus, Monro says, when an ulcerated cancer is reducing the patient so rapidly that he is likely to be carried off in a very short time by it, we should operate as the only means of prolonging the patient's days.* And Mr. Abernethy remarks, that the ulceration and self-destroying process of cancer are so horrible, that it may be stated, as an argument for the operation, that a patient gets rid of a quantity of disease upon easier terms by having it removed by the knife, than by suffering it to proceed in its natural course. When the scar or surface of the wound, after the operation, becomes indurated and cancerous, the patient suffers much less pain, and there is much less fetor in the disease thus formed, so that the patient's sufferings are on the whole much diminished †; a remark which perfectly coincides with the experience of a judicious foreign practitioner. ‡

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* Sir E. Home on Cancer, p. 62.

Nothing can be a stronger proof of the propriety of operating even upon many ulcerated cancers, than the unexpected radical cures which have been frequently known to follow operations which were undertaken merely with a view of lessening the patient's sufferings, and extending life for a short period. Thus, Le Cat operated and cured an enormous ulcer, which had rendered one rib carious, and destroyed several of the axillary glands. § Foubert successfully removed from a woman, at one time, both breasts; one of which was scirrhous, the other deeply ulcerated. ||

Another question is, whether we should operate more than once upon cases in which a relapse unfortunately happens, supposing the form of the tumour, and its relation to the adjacent parts, are not such as to constitute an impediment to the operation? A relapse is itself undoubtedly one of the most valid arguments against operating, because as the disease has already returned, and we are ignorant of its causes, it may return again. Should the relapse happen, however, in the situation which it previously occupied, the case is not so discouraging as when it attacks other parts; because, in the first instance, the return of the complaint may possibly be owing to some of the disease, which the surgeon could not discern, being left behind; while, in the second, no doubt is left about a constitutional tendency to the distemper.

Sabatier repeated operations for cancer, in two remarkable instances: a woman underwent one operation, which was very severe, owing to the largeness of the tumour. She enjoyed good health for ten years, but having then a relapse, she was

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* Edinb. Med. Essays, vol. v. art. 32.

† Abernethy on Tumours, in Surgical Works, vol. ii. p. 186.

‡ Klein, Chirurgische Bemerkungen, p. 261. 12mo. Stuttgart, 1801.

§ Journ. de Méd. 1761, t. iv. p. 258.

|| Mém. de l'Acad. de Chir. t. iii. p. 25.

operated upon again, and continued well at the end of five more years. The same surgeon operated three times upon an officer's breast, whose health was afterwards very* good. M. Lacombe records also an instance, in which he operated four different times upon a woman's breast, who, at the end of five years after the last extirpation, was enjoying perfect health.†

With a view to the prevention of relapses, Mr. Abernethy strongly urges the propriety of endeavouring, after the operation, to quiet the nervous system, and keep the digestive organs in as healthy a state as possible; and he recommends a mere vegetable diet, with as much milk, broth, and eggs, as is just sufficient to hinder the patient from losing strength.‡

Other surgeons, like Klein, Flajani, &c. appear to have confidence in issues, which they recommend to be kept open a long time.§ Abroad, an idea also prevails, that relapses are less frequent, when the wound is not healed by the first intention, but allowed to suppurate.|| As, however, this was the old practice in England, and it had not attractions enough to preserve its ground amongst us, I see no reason for restoring a method certainly attended with numerous disadvantages.

CHAP. XXVI.

FUNGUS HÆMATODES, OR SPONGOID INFLAMMATION.

WE are indebted to Mr. John Burns¶, of Glasgow, for the first distinct account of this formidable disease; and the subsequent and additional particulars of the subject, published by Hey, Freer, Wardrop, and others, have afforded a good deal of information respecting the history of the distemper. It commences with a small colourless tumour, which

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* Sabatier, Méd. Operatoire, t. ii. p. 335.

† Lacombe, Propositions sur le Cancer, Paris, 1805.

‡ Abernethy on Tumours, p. 93, in Surgical Works, vol. ii.

§ Chir. Bemerkungen, p. 264. Collezione d'Osservazioni, &c. di Chirurgia, t. i. p. 207, &c.

|| Flajani, Op. cit. t. i. p. 278.

¶ Dissertations on Inflammation, vol. ii.

is soft, when not covered by an aponeurosis, but firm when situated beneath it.

When the disease occupies merely the adipose, or cellular membrane, upon the surface of the muscles, the tumour is not usually painful in its beginning; nor does it impede the motion of the muscles on which it is seated. But when deeply seated in the limbs, it causes pain and weakness of the part affected. Also, when it occurs in the mamma, its growth is attended with considerable pain. *

For a considerable time, the tumour is smooth and even, but afterwards projects irregularly at one or more points, and here the skin becomes thinner, and of a livid red colour. The swelling has a considerable degree of elasticity, yielding to pressure, and rising up again immediately this is taken off.

The sensation of a fluctuation often seems to be so manifest, that the mistaken surgeon plunges a lancet into the tumour, with the intention of discharging the fluid supposed to be present. † An error of this kind is generally a serious one, as a painful bleeding fungus, which rapidly acquires a very large size, shoots out of the opening, and by the irritation and loss of blood which it occasions, soon destroys the patient. But in the natural course of the disease, openings are at length formed in the projecting parts of the swelling, and a thin bloody matter is discharged. Almost immediately after the formation of these apertures, a small fungus protrudes, which rapidly increases both in breadth and height, and frequently bleeds profusely. The discharge is thin, and exceedingly fetid. The integuments round the ulceration are red and tender. The neighbouring glands swell, and assume the spongy morbid structure of the original tumour. If the patient still survives, similar tumours frequently make their appearance in other situations, and hectical symptoms, and repeated hemorrhages, put a period to life.

On examining the affected parts after death, or amputation, the tumour itself is found to consist of a soft substance, somewhat like the brain; membranous partitions intersect it, and there are cells, or abscesses, in various places. The tumour frequently dives between the muscles down to the bones, and is not invariably contained in an entire cyst. The adjoining muscles are of a pale colour, and lose their fibrous appear-

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* Hey's Pract. Obs. in Surgery, p. 290, 291, edit. 2.

† See Wardrop on Fungus Hæmatodes, p. 126. M'Kechnie's Case of Fungus Hæmatodes, in Edinb. Med. and Surg. Journal, vol. vii. p. 168. Earle in Med. Chir. Trans. vol. iii. p. 60.

ance, becoming more like liver than muscles. The bones near the tumour are always carious. The disease sometimes appears to be brought on by external violence; but frequently the cause is quite unknown.

Fungus hæmatodes has now been observed in numerous situations and organs, viz. the eye-ball, the superior and inferior extremities, the testicle, liver, spleen, kidney, lungs, uterus, ovarium, mamma, thyroid gland, neck, and fauces.

There is no remedy with which we are acquainted, that seems to have the least power in checking this formidable disease; all escharotics, even undiluted oil of vitriol, are incapable of destroying the fungous growths as fast as they are regenerated. Nothing seems to offer a prospect of preserving life, except the early and total removal of the disease with a knife. This, of course, is not always practicable, on account of the situation of the tumour. When it can be done, no part of the surface surrounding the tumour should be left, as the disease would certainly recur.

Here, however, it is incumbent on me to state the melancholy truth, that, excepting an instance or two where the eye-ball appears to have been removed with the promise of lasting success *, almost every attempt to extirpate the disease by simply cutting away the morbid part has failed, the fungus reappearing with increased malignity. The only cures with which I am acquainted, are a few which were accomplished by amputation of the limb, and are related by Mr. Hey. But, as the observations of the same gentleman prove, even amputation does not always have the desired effect; for, if the distemper has extended itself in the slightest degree to any part of the stump, a relapse appears to be certain.

It is much against the general success of all attempts to extirpate fungus hæmatodes, that the distemper is frequently not confined to one part or organ. Thus, when the disease has appeared on the lower extremity, tumours of the same nature have been observed, after death, situated in the lymphatic glands, along the course of the iliac vessels and abdominal aorta; and when the eye-ball has been the seat of the disease, various little spots or tumours, resembling in structure the medullary, or cream-like consistence of fungus hæmatodes in general, have been observed between the cranium and dura mater, and between the tunica arachnoides

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* See Hey's Practical Observations, p. 290. edit. 2; and Wardrop on Fungus Hæmatodes, p. 81.

and pia mater. On the whole, I am inclined to think with a modern author, that fungus hæmatodes is either originally a constitutional disease, or very soon becomes so. *

Mr. Wardrop † seems to consider the medullary sarcoma, described by Mr. Abernethy, as fungus hæmatodes, an opinion, however, which the latter gentleman informs me he does not adopt. The chief differences that I can discern are, that in the medullary sarcoma, after the parts have sloughed out, the place heals, until another similar swelling bursts the skin; but, in fungus hæmatodes, the fungus always grows larger and larger, without being materially retarded by sloughing and no healing process ever occurs.

According to Mr. A. Burns, in fungus hæmatodes, the body of the tumour is intersected by numerous membranous bands; but, in medullary sarcoma, the mass is of a uniform pulpy consistence, and resembles in colour the cortical portion of the brain. ‡ But, as Meckel very correctly remarks, the colour of fungus hæmatodes is subject to great variety. §

Although fungus hæmatodes has generally been confounded with cancer, it is undoubtedly a widely different disorder. Instead of being hard and unyielding, like a scirrhous tumour, it is generally soft and elastic. Instead of being intersected by the same kind of ligamentous fibres, or bands, which exist in a scirrhus, fungus hæmatodes consists of a soft pulpy matter, which mixes readily with water, and is hardened by acids, or by being boiled in water. When the skin, or external covering, of fungus hæmatodes gives way, instead of the morbid growth being destroyed by ulceration, as in cancer, a quick growing fungus arises from it, and the tumour seems to increase with even greater rapidity. This fungus, instead of having a firm texture, like that which sometimes arises from a cancerous ulcer, is a dark red or purple mass, of an irregular shape, and of a soft texture, is easily torn, and bleeds profusely when slightly injured. A primary cancer seems to be confined to few organs and few textures, and while, in some of these, fungus hæmatodes in its primary state has not been seen, it has been detected in other parts, where no true scirrhous structure has ever been met with, as, for instance, the liver, spleen, kidney, and lungs. While cancer also is

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* C. Bell, Surg. Obs. vol. i. p. 410.

† Observations on Fungus Hæmatodes, p. 3.

‡ Surgical Anat. of the Head and Neck, p. 220. Edinb. 1811.

§ Handbuch. der Pathologischen Anat. b. ii. Abth. 2. p. 298, 299.

rather a disease of advanced life; most patients attacked by fungus hæmatodes are young. *

Fungus hæmatodes of the eye will be described in the second part of this volume.

The particular swelling of the upper part of the calf of the leg, a case represented by Mr. Pott, in his remarks on amputation, as requiring this operation, is, no doubt, an instance of fungus hæmatodes. †

CHAP. XXVII.

ANEURISM.

THE varieties of this disease are of so opposite a nature, as to defy every attempt to embrace them all in one definition. We may say, however, that an aneurism is generally a pulsating tumour, arising from a dilated, ruptured, or wounded artery, and filled with blood, which is sometimes in a fluid, and in other instances, in a more or less coagulated state. It originates either from an alteration of structure and consequent dilatation of the several coats of a part of an artery, or from a dilatation of the external tunic alone, the inner coats having previously given way in consequence of disease, or violence.‡ These forms of the complaint constitute

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* See Wardrop on Fungus Hæmatodes, chap. xii.

† Besides the works already quoted on this disease, the reader will find himself gratified with a perusal of the following observations or cases on the subject. Langstaff in Med. Chir. Trans. vol. iii. p. 277. vol. viii. p. 272. vol. ix. pt. 2. Abernethy on Tumours, in Surg. Works, vol. ii. sect. on Medullary Sarcoma. Wishart in Edinb. Med. and Surg. Journ. vol. vii. Laennec sur les Mélanoses in Bulletin de la Société de Méd. 1806.

‡ This last example is named by some authors *mixed;* a term also applied to an aneurism supposed to proceed from a wound of the outer coats of an artery, and the dilatation of the inner tunic. Arnaud calls the latter form of disease *hernia arteriæ;* but, probably, it is a case which has never existed, except in the fancy. I should mention, however, that in the year 1804, Dubois is said to have demonstrated to the Ecole de Médecine at Paris, two specimens of the *aneurysma herniosum,* which were found in the thoracic and abdominal aorta of a dead subject, and, of course, could not have arisen from any partial wound. The French imagine, that these herniæ of the internal coat of the aorta proceeded from a destruction of the external and middle coats by ulceration; and aware of the impossibility of the thing happening in the other arteries, they attempt to account for what they thought they saw in the aorta, by the lining of this vessel being more elastic than that of smaller arteries. See Dict. des Sciences Méd. t. ii. p. 112.

the cases which, I think, ought still to be called *true aneurisms*, in which the sac is really a dilated part of the artery itself. Such authors as do not draw a line of distinction between a merely dilated and an aneurismatic artery, (a difference on which I shall have presently to dwell,) call a true aneurism *diffused*, when it occupies a considerable portion of the length, and the whole circumference of the vessel; and *circumscribed*, when things are the reverse of this state. When all the coats of an artery are wounded, ruptured, or perforated by ulceration, the tumour is called a *false aneurism*. Here the blood is either extensively effused in the cellular membrane, the case being named accordingly a *diffused false aneurism*; or it is collected in one mass, which is bounded by a kind of cyst, that is soon formed around it by the adhesive inflammation: this is the *circumscribed false aneurism* of various writers.* Both varieties of false aneurism are, therefore, not necessarily attended with, nor preceded, by any dilatation of the arterial coats; and, though that which is *circumscribed* has a sort of cyst, this is not composed of any of the coats of the artery, but of a new membrane-like substance, formed by the adhesive inflammation.

An aneurismal swelling, which arises directly from a wound or breach, extending through all the coats of the artery, is sometimes known by the appellation of a *primitive false aneurism*; while other cases, which either began with a destruction of the inner coats, and have terminated in the giving way of the external coat, or which began with dilatation, and have now ended in a rupture of all the tunics, are termed *false consecutive aneurisms*.†

If a direct communication be formed between a large artery and its accompanying vein, as sometimes happens in venesection, where the lancet transfixes the vein and opens the subjacent artery, the wound in the skin may heal up, while the opening between the vein and artery may continue permanent, the arterial blood gushing into the former vessel at each pulsation of the heart, and producing in a very short time a remarkable varicose swelling, accompanied with peculiar symptoms. Such is the nature of the *varicose aneurism*, or *aneurismal varix*. Lastly, the *aneurism by* ‡ *anastomosis*

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* Nuck first proposed the division of aneurisms into true and false, according as they were with or without dilatation of the arterial coats.

† Dr. Aug. Frid. Ayrer über die Pulsadergeschwülste, p. 19. Göttingen, 1800. Also C. D. Kuhln de Aneurysmate Externo, p. 4. 4to. Jenæ, 1816.

‡ See John Bell's Principles of Surgery, vol. ii. p. 456.

anomalous aneurism, or *aneurysma exsudans* *, is totally different from any of the preceding forms of disease, as it proceeds from a morbid growth, or dilatation of the arterial ramifications, by which a very vascular interstitial substance is produced, which has a singular propensity to increase to a great and dangerous extent, and which, when cut or broken, bleeds with incredible obstinacy.

The observations of Professor Scarpa † tend to deny altogether the existence of that form of true aneurism, which is represented by authors as consisting in a dilatation of all the coats of an artery, and he endeavours to prove from dissections, that in every aneurism there is a solution of continuity, or rupture of the internal and muscular coats of the vessel, without the concurrence of a preternatural dilatation of these coats being essential to the formation of the disease. Aneurism, says he, in whatever part of the body it is formed, and from whatever cause it arises, is never occasioned by the dilatation, but by the rupture, or ulceration of the internal and muscular coats of the artery, and, consequently, these coats have not the smallest share in the formation of the aneurismal sac, which, he observes, is undoubtedly composed of the cellular sheath, which the artery receives in common with the parts contiguous to it. ‡

Scarpa then disbelieves in the reality of that form of true aneurism, described by writers as attended with a dilatation of all the coats of an artery. His remarks extend further, indeed, for, he condemns the division of aneurisms into true and false, as totally incorrect, not admitting, even as an exception, the case which I have mentioned, as accompanied with a dilatation of the external coat alone, and a rupture or ulceration of the middle and inner tunics.

At first, the reason of Scarpa's sentiment upon this latter point seems obscure, until he takes an opportunity of explaining, that he does not agree with the generality of anatomists in considering the covering of an artery, as one of its proper coats, but merely as an adventitious sheath, or cellular investment, which the artery receives in common with the parts, in the vicinity of which it runs. § How Scarpa could have confounded what is commonly termed the *sheath* of the artery, with the external elastic coat of the vessel, appears surprising, unless we suppose him to have been led astray by a determination to leave no room for the supposition of any case of aneurism, to which the expressions *true*, or *with dilatation*, of any of the proper coats of the artery, could be applied. That minute and accurate observer of the texture of arteries, Dr. Jones, has remarked, that the external tunic derives from the particular arrangement of its component fibres, a characteristic appearance, which distinguishes it from cellular membrane, and entitles it to be ranked as a *proper* coat of an artery. Having described its whiteness, density, great elasticity, &c., he then notices the *sheaths*, in which the arteries are contained while in their natural situations, and to which they are connected by means of fine cellular membrane. * If, therefore, the arteries really have, besides their sheath, an external elastic coat, as I think is quite evident, it follows, that when Scarpa specifies the invariable ulceration or rupture of the muscular and internal coats, in proof of the impossibility of a true aneurism, he is unjustifiably passing over another form of true aneurism, in which the external coat of the vessel is actually dilated.

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* So named by Professor Graefe, of Berlin, on account of the blood seeming to exude through the coats of the diseased vessels. See Angiectasie, p. 22. 4to. Leipzig, 1808.

† Sull' Aneurysma Riflessioni ed Observazioni Anatomico-Chirurgiche, fol. Pavia, 1804.

‡ See Transl. by Wishart, p. 113.

§ On the Anatomy, Pathology, &c. of Aneurism, transl. by Wishart, p. 69.

The attention of several eminent surgeons has been of late particularly directed to the question before us, — whether any aneurisms really consist of a dilatation of the arterial coats, without a rupture or ulceration of all the three coats together, or of the two internal coats by themselves. The results of these investigations are very adverse to the side which Professor Scarpa has espoused; and the doctrine of true aneurisms, or aneurisms by dilatation, is still most respectably, and, I believe, successfully defended. † "My own observations (says Mr. Hodgson) will not allow me to coincide with Scarpa, in defining aneurism to be constantly produced by the destruction of the coats of an artery. On the contrary, the inspection of innumerable preparations of this disease, contained in the principal museums of this metropolis, and the more minute examination by dissection, of various specimens of diseased arteries, and of aneurisms in the different stages of their formation, have produced a conviction in my mind, that, although in most aneurismal sacs, especially in those which have arrived at a considerable size, the coats of the vessel have given way, yet, in a great proportion of aneurisms, the disease commenced in a partial dilatation of the coats of the artery." We are not to suppose, however, that Scarpa means to exclude a preternatural dilatation from the catalogue of diseases to which the arteries are liable; on the contrary, in several parts of his writings, he speaks of a yielding of the arterial coats with a weakening of a part, or of the whole circumference of the artery. But, such morbid dilatation he always considers as a disease totally distinct and different in many particulars from aneurism.* The root of an aneurism of the aorta, says Scarpa, in whatever point of this artery it appears, never includes the whole circumference of the tube of the artery, but constantly occupies and involves only the one, or the other side of the artery, from which side the aneurismal sac rises and enlarges in the form of an appendix or tuberosity, more or less large and extended, according to the circumstances of the place, or of the period of the disease; while, on the contrary, the dilatation of the artery occurs constantly in the whole circumference of the tube, and therefore differs essentially from aneurism.† The dilatation of an artery, he says, is not an affection, properly speaking, organic, as the blood is always contained within the cavity of the vessel; in the track of the expanded artery, no masses nor layers of grumous blood are ever found, as in aneurism; the dilatation never forms a tumour of considerable bulk; and, as long as the continuity of the proper coats of the artery remains uninterrupted, the circulation of the blood is not perceptibly changed.‡ There can be no doubt, I think, respecting the reality of the differences between aneurism and the dilatation of an artery, and that circumstances appear fully to warrant a distinction. Yet I cannot omit this opportunity of condemning all attempts to generalize too much, — a desire which often leads men of the most distinguished talents into error. Thus, Scarpa not only contradicts himself with respect to the question of whether dilatation always includes the whole periphery of the artery or not; but he falls into another inconsistency equally glaring, for we find him, in one place, asserting that by dilatation a swelling of large size can never be formed, yet, afterwards, himself adduces a morbid dilatation of the arch of the aorta, where the tumour was six inches in length and five in * breadth. The case is mentioned by Scarpa, to prove the inaccuracy of the common conjecture, that coagulated blood is only found in large dilatations of the arteries, and not in smaller tumours of this nature. In the considerable swelling here specified there was not the least vestige of the lamellated coagulum, which is constantly found in aneurism.

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* On the Process employed by Nature in suppressing the Hemorrhage from divided and punctured Arteries, &c. 8vo. Lond. 1805, p. 5.

† Ueber die Pulsadergeschwülste von A. Scarpa; Zurich, 1808, mit Anmerk und Zusätzen von Christ. Fr. Harles, p. 299, &c. Hodgson's Treatise on the Diseases of Arteries and Veins, &c. 8vo. Lond. 1815, p. 59, &c. Kreysig, Ueber die Krankheiten des Herzens, theil ii. abth. 1. Berlin, 1815, p. 381, &c. Spangenberg, in Horn's Archiv. für Med. Erfahrung, 1815, heft. 2.

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* Memoria sulla Legatura delle Principali Arterie degli Arti, con una Appendice all' opera sull'Aneurisma, p. 87, &c. fol. Pavia, 1817. Here we see Scarpa admits the occurrence of dilatation at a part of the circumference of the artery, — a point which, as appears from the quotation I next cite, he positively denies in the first part of his work. "Sometimes (says an accurate writer) the dilatation is partial, and occupies only one side of the vessel." Hodgson on Diseases of Arteries, &c. p. 47.

† In the appendix, p. 92., published 1817, Scarpa speaks of dilatations on the arch of the aorta, which were not larger than half a bean, and which, of course, could not affect the whole circumference of the vessel. These, however, are said to have had the other distinguishing characters of dilatation.

‡ See Scarpa's Treatise on Aneurism, transl. by Wishart, p. 56, 57.

In aneurism, the blood passes into a cavity, which is, as it were, out of the track of the circulation; there its course is retarded; and there it invariably deposits lamellated coagula, and sometimes in such quantity as entirely to fill the cyst. If, says Scarpa, any breaches of continuity happen in the inner surface of a morbid dilatation, it is only within the cavities of such solutions of continuity and roughnesses that coagula are deposited †, and all the rest of the inner surface of the disease is entirely free from them. These solutions of continuity and inequalities on the inside of a dilated artery, Scarpa very justly regards rather as the beginning of another disease, totally different from dilatation, viz. of aneurism formed consecutively to this latter affection. Mr. Hodgson, who has given a very correct account of the changes in a dilated artery, observes, that smaller sacs or pouches often grow from the sides of the great cyst, and are lined with a calcareous crust; and that, in other instances, the dilated coats appear to have given way at some point, and an aneurism is thus, as it were, ingrafted upon the dilated artery.‡

Besides these distinguishing characters of the two diseases, modern pathologists advert to others not less worthy of notice. When the morbid dilatation of an artery is partial, or confined to one side of the vessel, resembling a thimble in shape, the opening through which the blood passes into the cyst

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* Mem. sulla Legatura, &c. p. 90.

† See case in A. Burns on Diseases of the Heart, p. 206.

‡ Hodgson, op. cit. p. 46., also p. 72, &c.

is as large as the fundus of the cyst itself. And, when the dilatation occupies the whole circumference of the arterial tube, the tumour, thus produced, constantly has a cylindrical or oval shape; and if it be so situated as to admit of being compressed, it readily yields to the pressure, and almost disappears; while in the dead subject it seems much smaller than in the living. But aneurism, says Scarpa, presents entirely a different aspect. This sanguineous, pulsating tumour, whether preceded by a dilatation of the proper coats of the artery or not, always has its origin from one side of the vessel. Its neck, or that part through which the blood must pass in order to get into its cavity, is more narrow than the rest of the aneurismal pouch. The swelling has an irregular shape, yields under pressure with difficulty, and is nearly of the same size both in the living and the dead subject. Lastly, while the preternatural dilatation of an artery is increasing in size, the proper coats of the vessel grow thinner and thinner; but in proportion as an aneurism gets larger, the thickness of its sac is augmented.*

In illustration of the foregoing observations, Scarpa quotes an interesting case, recorded by Professor Vacca of Pisa†, in which a man, aged sixty, had for four-and-twenty years a small pulsating tumour in the course of each subclavian and axillary artery. The one on the right side was a specimen of dilatation of the artery in the whole of its circumference, was of a cylindrical shape, of the size of a small egg, and entirely disappeared under pressure. The left afforded an instance of an aneurism by rupture at four different points, which aneurism had been preceded by dilatation of the vessel; it was larger, and of an irregular shape. On examining the body after death, the right swelling was found to be diminished by more than half, so that hardly any prominence could be distinguished in the place, where, during life, rather a considerable swelling had existed. But, on the left side, things were quite different; for, here, the prominence was nearly as great after death as it had been during life.

As these two diseases were obvious both to the eye and touch, they admitted of discrimination by the symptoms. The cylindrical shape of the tumour on the right side, and the facility with which it yielded or subsided under pressure, indicated that it was a morbid dilatation of the right subclavian artery; while the irregular figure, hardness, and elastic resistance to pressure, which were observable in the left tumour, denoted the existence of an aneurism by rupture, though both swellings were attended with pulsation.

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* Scarpa in Memoria sulla Legatura delle Principali Arterie, &c. p. 93.

† Italian Transl. of Sprengel's Geschichte der Chirurgie, part ii. p. 294. I do not find this case in the original German work.

When such cases are situated in the chest or abdomen, they cannot, of course, be distinguished from each other by the symptoms; but, fortunately, the means for palliating the two diseases, and retarding their sad consequences, are the same. The event of the two cases, however, may differ very much; for, as Scarpa remarks, if the case be an internal aneurism, some very slight hope may be indulged that a radical cure will be effected by nature or art; which hope, however, can never be entertained in any instance of morbid dilatation. Experience proves, says he, that the *spontaneous* cure of an internal aneurism may happen, whenever the impetus of the circulation is lessened, and the lamellated coagula completely fill up the aneurismal sac. When this is accomplished, nature finishes the rest of the cure, just as she does when the main artery of a limb is tied; with this difference, that, in an *internal* aneurism, the coagulum shuts up the burst side of the artery, without intercepting the course of the blood through the vessel; while, in an *external* aneurism, the coagulum plugs up the sac and tube of the artery both together. This fortunate combination of things cannot be hoped for in cases of dilatation, because however diminished the force of the circulation may be, coagulated blood is never deposited in a pouch, that consists of a preternatural expansion of the proper coats of an artery. *

That there are some irreconcilable expressions in Scarpa's account of aneurism and dilatation, I think, will be generally allowed. Perhaps, however, we are to conciliate some things by supposing his opinions partly changed in the interval between the publications of his great work on aneurism and of the late appendix. Certainly, he now admits the possibility of dilatation confined to a part of the circumference of an artery. The difference between this particular case and the true aneurism of surgical writers is not very clear to me, unless it depend upon the comparatively large size of the communication between the vessel and the cavity of the swelling, in the case of dilatation, and upon the smaller size of the neck of an aneurism, in relation to the fundus of its cyst. † The absence of lamellated coagula exists in both instances, and affords no means of discrimination.[*] Scarpa, we find, describes the coats of the vessel as getting thinner as the dilatation enlarges, and the sac of an aneurism as becoming thicker as the tumour increases. This observation, however, if correct, would only serve as a criterion between dilatations and aneurism by rupture, because it is only in relation to such cases that it is made. But it may not be entirely accurate, for Mr. Hodgson describes the coats of the artery in preternatural dilatations of the aorta, as being remarkably thickened, and the inner coat, on which calcareous matter is deposited, as being so much increased in thickness, as to resemble the peritoneum of an old hernial sac.[†] Some other differences between the histories of the formation of aneurism, as given by Scarpa and the best modern writers on the subject, are, of course, easily reconciled by adverting to what I consider an error on the part of that eminent Professor, viz. his not admitting that the arteries have any external, cellular, or elastic coat besides what is usually named the sheath of the vessel.

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* Scarpa, in Memoria sulla Legatura delle Principali Arterie, &c. p. 94—98.

† "The mouth of these sacs is generally larger than any other part of the cavity." Hodgson, p. 69.

I shall conclude these reflections on the formation of aneurism, with observing, that whether the case begin with dilatation or not, in the end there is almost constantly a rupture, or ulceration of all the coats of the artery. In most instances, the aneurism is formed by a destruction of the internal and middle coats of the vessel, and the expansion of the external coat into a sac, which at last giving way, the sheath of the artery and the surrounding parts form the boundary of the tumour. The disease, in fact, changes from a species of *true* aneurism, or what is sometimes named the *mixed*, into a *consecutive false aneurism*. On the other hand, the sac which is formed by the dilatation of all the coats of an artery, as it advances in size contracts firm adhesions to the parts, which are in its immediate vicinity; so that when the dilated coats give way, the effusion of blood is restrained by these adhesions, or rather by the timely effects of new adhesive inflammation, and, as Mr. Hodgson observes, the sac then continues to be formed in the same manner, as when an aneurism is in the first instance produced by destruction of the coats of the vessel. Sometimes, however, the sac bursts so suddenly, that the adhesive inflammation has not time enough to circumscribe the hemorrhage, and a diffused extravasation follows.[‡]

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[*] See Hodgson on the Diseases of Arteries, p. 46. and p. 82.

[†] Op. cit. p. 45, 46.

[‡] See Hodgson on Diseases of Arteries, p. 71.

The occurrence of a pulsating tumour near a large artery is always a sufficient reason for suspecting the disease to be aneurism; but, as other swellings, and even abscesses in the vicinity of an important artery, sometimes have a throbbing motion communicated to them by the neighbouring vessel, no positive judgment should be formed, until other circumstances of the case have been duly considered. I once saw a large abscess, at the side of the lumbar vertebræ, in a blue-coat boy, where the tumour pulsated with as much force as any aneurism which I have ever examined. A boy was admitted into Guy's Hospital for a fracture of the sternum, about a fortnight after the accident. The broken parts of the bone were a good deal separated, and the interspace occupied by a considerable tumour, the integuments retaining their natural complexion. The swelling had as regular a contraction and dilatation as the heart itself, or the aorta could be supposed to have. Upon pressure, the tumour receded; upon a removal of the pressure, the tumour immediately resumed its former size. The nature of the disease being considered uncertain, the case was left to take its own course. The event was, the tumour burst in about three weeks; discharged a considerable quantity of matter; and the patient did well with very superficial applications. * In order to discriminate certain pulsating tumours from aneurisms, writers direct us to recollect, that in the first cases, the alternate rise and fall of the swelling amount to a real change of situation; while in an aneurism the motion proceeds from an alternate dilatation and contraction of the tumour at every point of † it. I confess, however, that the recollection of this fact has not seemed to me to facilitate the diagnosis in actual practice; for it is often equally difficult to pronounce, whether what we see is a displacement of the swelling, or only an expansion of it.

In cases of diffused false aneurism, the pulsation is generally very indistinct, and often quite imperceptible. The same well informed writer, whom I have just now quoted, relates an instructive example of this total absence of pulsation. The case was a large diffused false aneurism. The thigh was enlarged to a very great size. The tumour was uniform, and extended from the inside of the knee to within a small space of the groin. The integuments were every where of their natural colour. The inside of the thigh was soft, and presented a kind of fluctuation; but not the least pulsation could be distinguished either here or at any other point. The tumour at

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* Warner's Cases in Surgery, 8vo. Lond. 1784, edit. 4. p. 155.

† Dict. des Sciences Med. t. ii. p. 91.

its superior, posterior, and lateral parts, was of a stony hardness. It was judged advisable to make an incision into its most prominent part, when a stream of florid blood immediately gushed out, and evinced the true nature of the disease. As surgeons knew less then, than now, how aneurisms ought to be treated, the limb of the patient was immediately amputated. The diffused nature of this aneurism, and the large quantity of coagulated blood within it, which had acquired the texture and appearance of brown macerated leather, are circumstances fully accounting for the absence of pulsation. * Another very experienced surgeon tells us of a case, in which an axillary aneurism, which had no pulsatory motion, was opened from an idea that it was a collection of matter; but as the puncture was small, immediate death was prevented, by the application of sticking plaster. † I once saw a large popliteal aneurism, which extended a good way towards the front of the limb, had a very solid feel, and not the slightest pulsation. The case was considered by many other surgeons, as well as myself, to be some kind of fleshy tumour, so involving the knee-joint, as to admit of no other mode of extirpation but amputation of the limb. Previously to the operation, however, an abscess lancet was plunged into the tumour to the whole depth of the blade, without giving issue to any fluid. ‡ I believe this to have been an instance, in which the absence of pulsation had been caused by the cavity of the aneurism having become nearly filled with coagulated blood; and that if we had not formed a wrong judgment of the nature of the disease, but left the case to itself, the popliteal artery would soon have become impervious, and a spontaneous cure followed.

A true aneurism, in an external situation, and commencing with a dilatation of all the coats of the artery, generally presents itself in the form of a small pulsating tumour, which subsides under pressure, and immediately re-appears when the pressure is taken off. It also subsides, or at least becomes more flaccid, when the portion of artery between it and the heart is compressed; but immediately resumes its usual fulness and pulsation, when such compression is discontinued. In other tumours, which derive a pulsatory motion from their lying over a large artery, pressure made on the vessel completely stops their alternate elevation and depression, but such

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* Warner's Cases in Surgery, p. 159.; in which work are recorded two other instances of aneurism, without pulsation.

† Pelletan, Clinique Chirurgicale, t. ii. p. 84.

‡ Lawrence in Medico-Chir. Trans. vol. viii. p. 197.

swellings remain as tense and prominent as ever; in an aneurism, on the other hand, the same experiment often only lessens the pulsation, without entirely suppressing it, since the anastamoses may still keep up a partial, indistinct throbbing, and the tumour almost always undergoes a diminution in its size and degree of tension. The true aneurism, in its commencement, is generally little painful; and the integuments are of their natural colour. The pulsations are strong, especially while the tumour is small, and in that form of the disease, where none of the coats of the vessel are as yet ruptured, because we know, that, in this state, no lamellated coagula are hardly ever deposited upon the inner surface of the sac. The greater strength of the pulsation in true aneurisms also depends very much upon the ample and direct communication between the expanded part of the vessel and the direct channel of the blood. In the other sort of true aneurism, where the inner tunics are destroyed, and the external coat alone dilated, the communication between the canal of the artery and the cavity of the aneurism, though not so large as in the preceding form of true aneurism, is more capacious than in a false aneurism, and therefore the pulsation of the disease is generally stronger than in the latter case. As, however, coagula are deposited within it, while they are not so in the first form of true aneurism, it loses in time the strong kind of throbbing, which characterises this other variety.

The symptoms of a circumscribed false aneurism do not differ very much from those of the foregoing examples. However, it is to be observed, that while a true aneurism readily yields to pressure, and recurs on its discontinuance, the false one yields with difficulty, and the swelling then returns very gradually. These differences are plainly referrible first to the diversity in the size of the direct communication between the aneurismal swelling and the canal of the artery; in the false aneurism, this communication, we know, is much more diminutive, than in either of the cases of true aneurism. Indeed, in the aneurism with dilatation of all the coats, the cavity of the swelling is in fact a part of that of the artery itself. In the circumscribed false aneurism, the blood is also generally more or less coagulated, so that it is less capable, than that of true aneurisms, without any rupture of the arterial tunics, of being made to disappear entirely by means of pressure.

With respect to the diffused false aneurism, it generally presents but a feeble and indistinct degree of pulsation, except very near the situation of the aperture in the artery. In consequence also of the extensive injection of the cellular membrane with blood, the case is at the same time attended with more discolouration, than any other forms of aneurism, unattended with inflammation. The history of the disease; its cause; its sudden formation, &c., also serve to throw light on the diagnosis.

Nor is the diagnosis of what is named the consecutive false aneurism difficult; for, when a case which has been for some time attended with the symptoms of true aneurism, and restricted to a certain form, suddenly undergoes an alteration of shape, and an increase of size, either becoming more protuberant at one or more points, or more extensively diffused, (in the latter case, with a material decrease, or loss of pulsation,) we have great reason to suspect, that a consecutive false aneurism has formed by the bursting of the original aneurismal sac. By the pressure of large aneurisms, an absorption is caused of all the surrounding textures, whether bone, cartilage, muscle, &c. It is curious, however, to remark with respect to the bones, that, however they may suffer in this way, in cases of popliteal aneurism, their condition rarely, or never gives any future trouble, after the aneurism itself has been cured. This kind of caries is also peculiar in never being accompanied with suppuration: it is a simple absorption of the texture of the bone.

From the increasing pressure of an aneurism, as the tumour enlarges, we see why the disease, though in its early state, it often causes little or no pain, may after a time produce most severe suffering, the largest nerves being compressed, and even pushed quite out of their natural situation. In internal aneurisms in particular, a variety of evils may arise, as difficulty of deglutition from the pressure on the œsophagus; complaints of the urinary organs, from pressure on the bladder, &c.; or, suffocation from pressure on the trachea. Large external aneurisms also generally produce, besides great pain, a serious impediment to the passage of fluids through the lymphatics and veins of the corresponding limb, which sometimes becomes enormously enlarged by an œdematous effusion.

When an external aneurism is about to burst, the event may be foreseen by a part of the tumour becoming particularly tense, raised into a conical prominence, something like the pointing of an abscess, and presenting a thin soft feel, and a dark purple colour. On the apex of this projecting part, a small slough forms, which generally spreads till it is of about the size of a sixpence, or shilling; and at length being detached, and coming away with the adjoining coagulum, is followed by the fatal hemorrhage. I have seen two or three cases, in which this mode of rupture was exemplified, and its correctness is confirmed by the corresponding reports of some of the best writers on aneurism.* According to Mr. Hodgson, when an aneurism bursts into a cavity, which is lined by a mucous membrane, like the œsophagus, intestines, bladder, &c. the breach is also produced in the same way; but when the sac projects into a cavity lined by a serous membrane, as the pleura, the peritoneum, and the pericardium, these membranes, after being rendered extremely thin, give way by laceration.

With respect to the causes of aneurism, there can be no doubt, that with the exception of those cases, which proceed from wounds, the generality of the instances which we meet with, are preceded either by a steatomatous thickening, with ulceration of the internal coats of the artery, or by calcareous depositions between the middle and internal coats, attended with loss of elasticity in the affected part of the vessel, and a disposition to crack, or give way. The blood then comes into contact with the external elastic coat, which is raised into an aneurismal swelling. At length, more or less of this coat is removed by absorption, or bursts, and the blood then receives a covering from the arterial sheath. As the disease advances, it presses upon, and causes the absorption of all the surrounding parts, and is more or less diffused or circumscribed, according as it may happen or not to be confined or bounded by an entire cyst, formed by the adhesive inflammation; the remains of the original sac; or the intervention of ligamentous expansions. Scarpa, who, as we have seen, makes no distinction between the external coat and the sheath of the artery, describes the solution of continuity as being occasioned by a wound, a steatomatous earthy degeneration; ulceration; or a rupture of the internal and muscular coats of the vessel.

In works of the greatest accuracy, we find accounts of aneurisms, which arose from violent efforts, forcible pressure on arteries, the reiterated bruising of parts, the force employed in reducing a dislocated humerus, the violence of falls, fractures, wounds †, &c. With the exception of cases, however, in which the coats of the artery are wounded by a sharp instrument, the point of a fracture, &c. together with other soft parts, we believe aneurism seldom proceeds from external violence, unless their coats be already in an unsound state. Mr. Hodgson assures us, that he has never met with the laceration of the coats of an artery, which had not undergone some previous morbid alteration, nor does he think it probable, that any exertion which did not lacerate the surrounding parts, could be sufficient to rupture the coats of a healthy vessel. The same valuable writer has ascertained by repeated experiments the inaccuracy of Richerand's statement [*], that in the ham, the inner coats of the artery are ruptured by violent extensions of the leg, since the laceration never happens, unless the extension be made in such a degree as to break the ligaments of the knee-joint. [†]

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* Pelletan, Clinique Chir. t. ii. p. 91. Hodgson on Diseases of Arteries and Veins, p. 85.

† See Pelletan's Clinique Chir. t. i. and ii.

As aneurism occurs more frequently in the large, than the small arteries, it is evident, that the impetus of the blood must frequently have a considerable share in its origin. True aneurisms, as Monro thought, take place as often in the aorta, particularly, its arch, as in all the other arteries together. Aneurisms also frequently occur in the ham, and wherever the arteries run unsurrounded by muscles, and are most exposed to external violence.

Patients frequently have several aneurisms at the same time. I have seen patients, who either had more aneurisms than one, at the same time, or who had had other aneurismal tumours before those which I had the opportunity of observing. A most remarkable example of a multiplicity of aneurisms, however, is mentioned by Pelletan; he counted in one subject not less than sixty-three aneurismal swellings, from the size of a filbert, to half that of a hen's egg. [‡] Many cases might be quoted, where the patient was afflicted at once with several aneurisms. [§]

The experiments of Mr. John Hunter, and Sir E. Home, have decidedly proved, that a mere local weakness of a part of an artery otherwise healthy will not occasion the formation of aneurism. These surgeons have shewn, that even dissecting off the outer coats of an artery will not cause this [||] effect. How erroneous, then, must the opinion be, that a mixed aneurism ever arises from a prick of the outer tunic of vessels, and a consequent dilatation of the inner coats.

Nor is the sudden laceration of the internal and middle coats of a sound artery ever the cause of aneurism: this fact is completely proved by the experiments of Dr. Jones, as well as by what happens in the practice of surgery, where small ligatures are now so commonly employed, and sometimes have even been taken off immediately after being applied, so as to leave the cut part of the internal coats exposed to the impetus of the circulating blood. This point, I think, is well deserving attention, because the opponents of Dr. Jones's doctrines have laid some stress on the danger either of aneurismal dilatations, or the too speedy ulceration of the artery, from the effect of a small ligature in dividing the inner coat of the vessel. As when the ligature is left on the artery, a coagulum forms within it, and fluid blood no longer comes into contact with the solution of continuity, some surgeons may be inclined to impute the prevention of the dilatation of the external coat to this occurrence; but the thing cannot be entirely owing to such cause, because we find, that when the ligature is taken off immediately after its application, and the current of blood is allowed to proceed as it did previously, no aneurism is the consequence. We must therefore conclude, that the formation of aneurism, except where all the coats of an artery are pierced, or cut, must generally be preceded by a morbid change in the arterial tunics; a fact, fully confirmed by what is disclosed to us in dissection.

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[*] Nosographie Chir. t. iv. p. 78.

[†] Hodgson, p. 64.

[‡] Clinique Chir. tom. ii. p. 1.

[§] See in particular London Med. Review, vol. i. p. 420.

[||] See Trans. of a Society for Med. and Chir. Knowledge, vol. i. p. 144.

DIFFERENT PROCESSES BY WHICH ANEURISMS ARE CURED.

Although it is the common course of aneurisms, when they are left to themselves, to increase in size, and at length to burst and destroy the patients by hemorrhage, sometimes things happen otherwise, and in consequence of certain changes taking place, a spontaneous cure is the result. There are four modes, in which this desirable event may be produced. 1. Sometimes the whole aneurismal swelling suddenly inflames and sphacelates: in this state, if the inflammation extend its effects to a sufficient depth, the sac in the vicinity of the artery, and a portion of the canal of this vessel itself, may become completely blocked up with coagulating lymph, so that no more blood can get into the tumour, the pulsation of which is suppressed. In cases of this description, the mortified parts, together with the mass of congealed and sometimes putrid blood in the sac, are cast off, and if the patient's constitution hold out, the ulcer left by the detachment of the sloughs heals up, and the cure is completed. When, however, the inflammation and sloughing are confined to the skin and superficial portion of the sac, the patient bleeds to death on the separation of the dead part. 2. The second kind of process, by which the spontaneous cure of an aneurism may be produced, is the increase of the lamellated coagula in such a degree within the aneurismal sac, as completely to fill it, in which case the blood also coagulates in the adjoining portion of the artery, which becomes impervious for a certain extent above and below the communication, which it had with the vessel. Similar changes happen when pressure succeeds in accomplishing the cure of the disease. 3. Scarpa and all the best modern surgical writers, until lately, supposed, that no aneurism could be cured, unless the sac and an adjoining part of the artery were thus obliterated: the facts which have been collected by Mr. Hodgson * leave no doubt, that when an aneurism of the aorta undergoes a cure, the sac alone may be filled up with coagula, while the vessel itself remains pervious. 4. The last manner in which spontaneous cure may be brought about is by the pressure of the aneurismal sac itself upon a subjacent portion of the artery.

As it is from the increase of coagulated blood within the tumour that the patient, generally speaking, has the best chance of a spontaneous cure, it must of course always be a desideratum to prevent the sac from becoming very large, which would lessen the probability of its cavity becoming entirely filled up with lamellated coagula. Sometimes, however, even when the tumour is of vast size, certain changes happen, by which the mouth of the sac is blocked up, the tumour loses its pulsation, and a cure ensues. But the best plan is always to resist as much as possible the increase of the tumour; and since its enlargement and ultimate rupture are caused by the force of the circulation, one grand principle, whenever we aim at promoting a spontaneous cure, must necessarily consist in lessening the impetus of the circulation.

We see the efficacy of such practice most strongly illustrated in the treatment of aortic aneurisms, those examples which have generally been represented as bidding defiance to the art of surgery. Yet, even such cases are not to be abandoned as absolutely hopeless, more especially, as the facts recorded by Mr. Hodgson justify the conclusion, that the disease will admit of cure without the adjoining portion of the aorta being rendered impervious.

TREATMENT OF ANEURISMS.

In aneurisms of the aorta, debilitating remedies, abstinence, a milk diet, occasional bleedings, the exhibition of digitalis, and the avoidance of all exertion, have been the means commonly recommended, rather with an expectation of

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* Treatise on the Diseases of Arteries, &c. p. 117. et seq.

retarding the disease, than of effecting a cure. The facts, however, which modern experience has adduced in favour of the efficacy of a treatment first proposed by the celebrated Valsalva, are certainly such as to justify a confident belief, that many internal aneurisms, even though large and much advanced, are capable of palliation, reduction, and cure. The cases published a few years ago, by M. Pelletan, surgeon to the Hôtel Dieu, at Paris, furnish the most convincing evidence, that vast aneurisms of the aorta, so large as to project through the absorbed part of the ribs and sternum, may sometimes in a very moderate time be reduced and cured by Valsalva's method. This chiefly consists, in bleeding the patient largely and repeatedly; in allowing only the most spare diet, nothing in fact but broth and acid drinks; in applying ice, or compresses wet with a cold lotion of vinegar and water, to the swelling; and lastly, in enjoining the strictest observance of silence and quietude. The quantity of blood that has been taken away in these cases is really astonishing: some of the patients, for the first few days of the treatment, having been bled several times a day. By Valsalva's treatment, Pelletan also effected the cure of a subclavian aneurism.* In aneurisms of the aorta, bleeding so as to induce fainting, is regarded as extremely dangerous†: the blood should be taken away slowly, and in little quantities at a time, the evacuation being repeated as often as may seem necessary and safe.

Setting out of the question Valsalva's method, the ordinary principle, on which external aneurisms are cured, consists in preventing the entrance of fresh blood into the aneurismal sac; for when this object is effectually accomplished, the blood already contained in the sac is gradually absorbed, the sac contracts, the whole tumour diminishes, and by degrees the power of using the limb is restored. The stoppage of the influx of blood into the sac may sometimes be fulfilled by the skilful application of pressure, particularly while the aneurism is small, and its contents can be made to recede. But, although it may be generally proper to try pressure in the early stage of the disease, it cannot be said, that the practice is attended with considerable success. I should suppose, indeed, that it does not answer in more than one case out of thirty; and a certain proportion of the successful instances on record are, no doubt, rather examples of a spontaneous cure. On the whole,

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* See Clinique Chirurgicale, par P. J. Pelletan, tom. i. Mém. sur les Aneurismes Internes. Paris, 1810.

† Hodgson, p. 161.

I am of opinion, that we have no inducement to make a long trial of pressure in any case of aneurism, and that when the disease is already large, and increasing with rapidity, it is better not to waste time upon the experiment. There can be little doubt, however, that pressure would more frequently cure the disease, if it could be made to operate effectually upon a given point of the artery, before this vessel reaches the aneurismal sac. The plan has many times been attempted, and ingenious compressing instruments devised; but unfortunately the large nerve, which usually accompanies every artery of importance, must also be compressed, and the agony which the patient experiences is so great as to compel the surgeon to relinquish the project. Another common cause of failure proceeds from the artery not admitting of being efficiently compressed against a firm surface underneath it: consequently, the circulation through the vessel still goes on, and the adhesive inflammation of its inner coat is not excited. Another plan of applying pressure consists in bandaging, with as much equality as possible, the whole limb inclusive of the swelling. Such is the method to which Genga*, Theden†, Scarpa‡, and several other modern surgeons give the preference. Here it seems as if the aim were rather to lessen the impetus of the circulation in the member generally, and promote the coagulation of the blood in the sac, than at once to stop the main flow of this fluid into the cavity of the aneurism; as we do, either when we compress or tie the artery above the aneurismal swelling. Whenever pressure is tried, the experiment should be conjoined with a low regimen, venesection, the exhibition of digitalis, and the application of ice, or cold lotions to the tumour. In this branch of surgery, however, it is highly necessary never to be unmindful of the dangerous consequences of immoderate and long continued pressnre; a subject on which I have offered several cautions in the chapter on mortification.

POPLITEAL ANEURISM.

The surgical methods of cure are only two, viz. compression, and the ligature. As Scarpa has observed, compression is not a mode in which much confidence of success can be placed, for procuring the radical cure of popliteal aneurism, except when the rupture of the artery is owing rather to an external cause, than to disease and ulceration of the arterial coats; when the two opposite parietes of the lacerated artery in the ham admit of being pressed against the inferior and posterior surface of the thigh-bone; and when the degree of pressure, which can be employed, is sufficient to excite deeply in the proper coats of the popliteal artery the adhesive inflammation, by which the artery is finally converted into an impervious ligamentous substance. The combination of these three circumstances is a rare occurrence. For, if we suppose what is seldom the case, that the coats of the artery have not been too much diseased, previously to their giving way, to admit of inflaming and adhering together, there are yet many other difficulties, which prevent the surgeon from applying to the artery that exact and steady degree of pressure, which is requisite for obtaining the complete and radical cure of the aneurism in the ham. The compressing force on the aneurismal sac must press down and remove from the artery the concentric coagulated layers of blood, so that the pressure may fall precisely on that portion of the vessel immediately above its rupture. This, says Scarpa, cannot take place except in a case of very recent popliteal aneurism, of very small size, and in which the coagulated blood can be made to descend below the place which we wish to compress. Besides this, it is necessary that the compression do not injure the great sciatic nerve, especially its large tibial branch. This it is very difficult to avoid, because the nerve runs on the back of the aneurismal sac, and is superficially situated immediately below the integuments and aponeurosis of the ham. Strong pressure on the nerve, also, renders this mode of cure insupportable and ineffectual. Nor can the plan answer, if the breach in the artery be too high up, where the femoral artery passes through the tendon of the triceps, or too low down, under the heads of the great muscles of the calf of the leg, where the vessel divides into the tibial arteries. In both these situations, pressure cannot be made to operate effectually in holding the parietes of the artery at the necessary point in close contact. Were the pressure powerful enough to force the artery against the posterior surface of the tibia, when the rent in the artery is low down, the obstruction of the inferior articular and tibial arteries, and gangrene of the leg, would be the inevitable consequences.

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* Anatomia Chirurgica, p. 219.

† Bemerk. und Erfahrung, 1. Th. Berl. 1778.

‡ Treatise on the Anatomy, Pathology, &c. of Aneurism, transl. by Wishart, p. 204. 231. 337, &c.

Such considerations induced Scarpa to lay down the following practical rules: compression is contra-indicated, whenever the popliteal aneurism is spontaneous, or not depending upon a wound, or violent stretching of the artery; when the aneurism is of long standing, and of large size; when it occasions acute pain and sympathetic fever; when it has produced considerable swelling of the leg and foot, with a diminution of their heat; and when the aneurismal sac is situated too high or too low in the ham. On the contrary, a trial of compression is proper, when the popliteal aneurism is very small, recent, and produced by a violent stretching of the artery; when it is indolent, soft, and yields to the pressure of the hand; when it is situated exactly in the middle of the cavity of the ham; and when it is not accompanied by swelling, nor numbness of the leg and foot. But, however favourable circumstances may seem to a trial of pressure, if it be found to excite severe pain, or swelling and torpor of the leg, it should be immediately given up. *

The operation for the popliteal aneurism consists in suppressing, by means of the ligature, the course of the blood through the popliteal artery, so that the current of blood, which passed by this artery, is conveyed to the leg and foot by the different channels of the lateral anastomosing vessels. The effect, in respect to the primary indication which the surgeon proposes to accomplish, is the same, says Scarpa, whether the artery be tied in the ham, a little above the breach in the vessel; whether the ligature be applied on the inner side of the thigh, in the middle, or at the top of the thigh; that is to say, we intercept the flow of blood through the popliteal artery into the aneurismal sac; and successively obtain the obliteration and conversion of the diseased artery into an impervious ligamentous cord. †

We are indebted to Mr. John Hunter ‡ for the greatest improvement ever made in the mode of operating for aneurism, and, more especially, the popliteal aneurism. He saw that much of the ill success of the old method arose from the severe practice of laying open the swelling, and tying the artery in the ham; a situation where it was least likely to admit of the adhesive inflammation, by which the vessel was to be obliterated. He was led, therefore, to try the infinitely better plan of taking up the femoral artery above the middle of the thigh, or at some distance from the point where the vessel perforates the tendon of the triceps muscle, and of

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* Scarpa, transl. by Wishart, p. 227—231.

† Op. cit. p. 235.

‡ See Trans. of a Society for the Improvement of Med. and Chir. Knowledge, vol. i. art. 9.

then leaving the tumour to be lessened by absorption, instead of laying it open. In short, the operation, as practised by the best modern surgeons, consists in making an incision about two inches and a half in length through the skin and fascia of the thigh, precisely over the course of the artery in its descent within the inner edge of the sartorius muscle. Professor Scarpa recommends us, however, to make the incision in the upper third of the thigh, or a little higher than the situation which Mr. Hunter selected, and his reasons for this alteration appear judicious. First, we thus avoid the necessity of removing the sartorius from its position, or of turning it back, for the purpose of getting at the artery. I have frequently seen the best operators, even professed anatomists, embarrassed by having the sartorius immediately in their way, when they had cut through the integuments and fascia. Secondly, the artery is more superficial a little higher up, than in the place usually chosen. And, thirdly, as being further from the disease, it is more likely to be sound, and in an advantageous state for the effects of the ligature.

It is a point of considerable importance in operations for aneurism to avoid all contusion, disturbance, and unnecessary handling of the part of the artery which we are about to tie; for thus we lessen the chance of the vessel inflaming too violently, and of ulcerating so as to give rise to secondary hemorrhage, which is the chief danger to which the patient is exposed. The organization of the blood vessels being similar to that of other soft parts, they must be subject, like these other structures, to inflammation, ulceration, and sloughing, as I have already explained in the chapter on hemorrhage. They are themselves vascular, and derive their nourishment from vessels (the vasa vasorum) which are transmitted to them from the parts which are immediately around them. Hence arises the very material advantage of separating the part of the artery which we are about to tie, as little as possible from its surrounding connections. In other words, the ligature should always be applied round an artery, as near as possible to the place in which the vessel lies amongst its natural connections. For many valuable observations in support of this principle, the profession are indebted to Mr. Abernethy *, the propriety of whose advice on this point is fully confirmed by the coinciding evidence of a Jones, a Hodgson, and a Scarpa.

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* See his Surgical Works, vol. i.

We should above all things keep this principle constantly in view in our next proceedings in the operation. We have divided the skin and fascia, and can feel the artery beating under our fingers. The next object is to divide the cellular membrane, till we can see the sheath of the vessel. We are now not to separate the artery to such an extent from the surrounding parts, as will allow us to put our finger under it, a practice which is a serious infringement of the principle above recommended, and, on no account necessary, but should cautiously make a slight puncture or scratch on each side of the undisturbed, undisplaced artery, and then pass a ligature with an eye-probe, or aneurism-needle under the vessel, observing not to include the femoral vein, and accompanying branches of the anterior crural nerve. The ligature is next to be firmly tied, one end of the ligature being afterwards cut off close to the knot, and the other left hanging out of the wound, the edges of which are to be immediately brought together with adhesive plaster.

If the operator prefer, however, to tie the artery with a ligature composed of fine dentists' silk, *he may then cut off both ends of it*, close to the knot, and endeavour to heal the wound by the first intention. This method I have seen tried by Mr. Lawrence; and, in another case, in which Mr. Carwardine, of Thaxted, operated, and the practice was tried, the whole wound healed by the first intention, not a particle of pus was formed, and the cicatrix continued sound. *

There have been several variations made in the operation by different surgeons. Thus, Scarpa still prefers avoiding to use the ligature in such manner as to divide the inner coats of the vessel, and, in order to prevent this effect, imitates Paré, Heister, and Platner, in interposing between the artery and the ligature a small cylinder of waxed linen. His advice on this point, however, has produced few or no converts to it in this country, where the principles established by Dr. Jones universally prevail. Since the practice of tying arteries with small ligatures came into vogue, and surgeons have taken care not to separate the artery too much from its natural connection, and not to irritate it with the presence of any extraneous substances, in addition to a single small ligature, the frequency of secondary hemorrhage has been surprisingly lessened, and operations for aneurism attended with the most brilliant success.

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* Lawrence in Medico-Chir. Trans. vol. viii. p. 492.

In the chapter on hemorrhage, I have adverted to some of the arguments which Scarpa has employed in defence of his precept, that, in tying the artery, we should avoid applying the ligature so as to cut through the inner coats of the vessel, and, therefore, should interpose between it and the noose a roll of linen. In the appendix to his great work on aneurism, he has also introduced an account of some experiments made by Professor Mislei, with a view of ascertaining whether ulceration of an artery is produced more quickly by the noose of a small ligature, or by the noose of a somewhat larger one, with the interposition of a roll of linen between it and the vessel. The tenor of these investigations is to prove, that the simple noose of a fine ligature produces ulceration of the external coat too rapidly, and creates a danger of secondary hemorrhage. Mislei details a case, in which he first tied the carotid of an old emaciated diseased mare, with a single ligature: but four-and-twenty hours afterwards hemorrhage took place. He exposed the artery therefore without delay, and applied a simple circular ligature above the aperture in the vessel, and below it a ligature with the interposition of a cylinder of linen. Thirty-nine hours afterwards, the simple circular noose was removed, and at the end of eighty-seven hours, the other ligature, with the roll of linen, was gently taken away. Twelve days after the removal of the first, the animal perished of hemorrhage from the superior angle of the * wound. This case is considered by Mislei as a complete proof of the superiority of the method of interposing a cylinder of linen between the artery and the ligature. When we carefully read over the particulars, however, we see that the animal which was the subject of experiment was in a very unfavourable state for the investigation, being very aged and diseased, with the artery in an ossified condition, highly unpropitious to the access of the requisite healthy kind of adhesive inflammation for the obliteration of the vessel in the situation of the ligature. There was also a good deal of handling, disturbance, and irritation of the vessel in the different proceedings which were adopted; a cause quite adequate to account for the secondary hemorrhage. I do not, however, attempt to explain why the bleeding happened to come from the part of the artery which had been tied with a simple circular ligature, and not from the other part, which was tied with the interposition of a roll of linen. One part might have been more exposed and irri-

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* See Scarpa's Memoria Sulla Legatura delle Principali Arterie degli Arti, con una Appendice all' Opera sull' Aneurisma, p. 75. Pavia, 1817.

tated, and more detached than the other from its natural connections. At all events, no positive conclusion is to be drawn from one experiment, and that too neither performed on the artery of a human subject, nor on the sound artery of a healthy animal.

On the continent, one or more ligatures of reserve are sometimes put loosely round the artery, above the first ligature with which the vessel is tied. These ligatures of reserve are meant to be tightened, in the event of secondary hemorrhage. But, when it is considered how much the artery must be detached from its surrounding connections by any supernumerary ligatures, and how likely these extraneous bodies are themselves to cause irritation of the wound, ulceration of the artery, and secondary hemorrhage, the danger of this practice is a very good reason for its rejection. Not one judicious surgeon in this country now remains an advocate for ligatures of reserve.

Œtius and Celsus *, Tenon, and others, mention the plan of tying the artery with two ligatures, and cutting through the intervening portion of the vessel; a practice, which was revived by two modern surgeons of considerable eminence about the same period, viz. Mr. Abernethy, and Professor Maunoir of Geneva. The former gentleman thought this method would leave the artery as nearly as possible in the same state in which it is on the surface of a stump; and that secondary hemorrhage from the femoral artery would then not be more frequent after an operation for a popliteal aneurism than after amputation. † But, as Mr. Hodgson observes, an artery tied in two places, and divided in the interspace, cannot be regarded as placed exactly in the same condition as an artery tied in amputation. In the latter case, the retraction of the vessel corresponds with that of the surrounding parts, which are divided at the same instant, and, therefore, its relative connections stand as before the operation. But, in the operation for aneurism, the retraction of the artery takes place without being attended with a corresponding retraction of its connections. How far the retraction of the artery is beneficial or injurious is by no means evident; and if it be supposed useful on the principle of hindering any tension of the artery, this fancied good may, in most situations, be obtained by simply laying the limb in a bent position. Many of the most experienced

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* Lib. v. cap. 26.

† See Abernethy's Surgical Works, vol. i. p. 227, &c.

operators in this country are content with the application of a single ligature [*]; and Scarpa [†] himself joins Heister [‡], Callisen [§], and Richter [||] in representing the use of the two ligatures, and the division of the artery, as at best but an indifferent proceeding. [¶]

Having already declared myself to be no admirer of the practice of compressing the artery between a cylinder of linen and the ligature, I can of course entertain no favourable opinions of any other analogous modes of operating, as executed with the presse-artère of Deschamps, the serre-nœud of Desault, or the instrument more recently proposed by Mr. Crampton. Nor do I hesitate to deliver the same judgment respecting the plans of compressing the artery between two metallic surfaces, as we see exemplified in the use of the pincers of Baron Percy, and of the very ingenious compressor [**] of Professor Assalini.

In the chapter on hemorrhage, I have noticed the expectations which were once raised by the interesting experiments of Dr. Jones, that, if a smallish ligature were tightly applied round an artery, the cord might be immediately afterwards removed, and still the tube of the artery become impervious. Had this hope been realized by later investigations, the surgeon would then have had no extraneous substance in the wound, which would have had a better chance of healing by the first intention, while the risk of secondary hemorrhage from ulceration of the vessel, induced by the irritation of the ligature, would have been entirely removed. From what I have previously said [††], however, the reader will already know, that the momentary application of a ligature is not found to be always followed by an obliteration of the tied part of the vessel.

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[*] See Hodgson on Diseases of Arteries, p. 222.

[†] "Il troncamento dell' arteria fra le due legature non e tutt' al più, che un' operazione indifferente." Memoria sulla Legatura delle Principali Arterie, &c. p. 16.

[‡] Institut. Chir. vol. i. p. 425.

[§] Princip. Syst. Chir. vol. i. 478.

[||] Anfangsgr. der Wundarzn. b. i. kap. 15.

[¶] In Mr. Abernethy's own practice, this method failed in one instance; an event which is ascribed by him to general causes. In some cases, in which the plan was tried by Monteggia, secondary hemorrhage ensued. (Instit. Chir. t. ii. ediz. 2da, p. 92. 95. 97.) Candour obliges me to observe, however, that these facts cannot weigh much, because Monteggia seems to have employed ligatures of reserve.

[**] See Plate I. fig. 3.

[††] See Chap. on Hemorrhage.

Mr. Travers * conceived that the temporary application of the ligature might prove a simplification of the practice employed by surgeons for obliterating the larger arteries; and one of the most important inferences drawn from his experiments is, that if a ligature be applied to an artery for twelve hours, the vessel is then so effectually closed, that the ligature may be removed, and the artery even opened without risk of hemorrhage. Mr. Travers is far from expressing any positive opinion respecting the propriety of extending this suggestion to the practice of surgery; and leaves the subject with mentioning the probability of his having some future remarks to communicate to the profession. Scarpa, however, seems already to have completely made up his mind on the preference which should be given to the removal of the ligature, as soon as the closure of the artery is sufficiently advanced to obviate all chance of its becoming pervious again, and it is strong enough to resist the impetus of the blood. He represents this period to be on the third or fourth day after the operation, when he recommends us to remove the ligature altogether, and not wait for its spontaneous detachment, as its longer continuance, he conceives, is of no further use, and may sometimes cause ulceration at the principal point of adhesion between the sides of the artery. † Although I fully agree, that a sufficiently firm closure of the vessel must generally have taken place long before the time when a ligature is spontaneously detached, yet I apprehend that if the momentary application of the cord will not suffice, we shall never derive any solid advantage from not awaiting its natural separation. If the ligature could be taken away directly after its first application, then we should be able to close the wound, and attempt to heal it by the first intention, and this with increased chances of success, inasmuch as the case would not be complicated with the presence of any extraneous substance. But, unless the thing can be done in the first instance, as a late critic has properly observed, we must, in order to be enabled to cut off the ligature, lose all the advantage of the chance of union by the first ‡ intention. In attempting to remove the ligature, there must also be

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* See Obs. on the Ligature of Arteries, and the Causes of Secondary Hemorrhage, with a Suggestion of a new Method of employing the Ligature in Cases of Aneurism, Med. Chir. Trans. vol. iv. p. 435, &c.; also vol. vi. p. 632—645, &c.

† See Memoria sulla Legatura delle Principali Arterie, &c. p. 51, &c. &c. Pavia, 1817.

‡ See Quarterly Journal of Foreign Medicine and Surgery, and of the Sciences connected with them, p. 29. Lond. 1818.

some danger of tearing the recent adhesion, and thus producing hemorrhage.

Such are the chief variations, which have been suggested in operating for the cure of aneurism, and more especially the popliteal aneurism. I have only to add, that, when the temperature of the limb sinks after the operation, the application of worsted and flannel should not be neglected.

OF FEMORAL ANEURISMS SITUATED HIGH UP THE LIMB.

Not many years ago, cases of this description were deemed incurable by any surgical operation, and, perhaps, until the present time, the same opinion might have prevailed, had not Mr. Abernethy * exemplified the possibility, not only of successfully tying the femoral artery above the giving off of the profunda, but even the external iliac artery itself higher than Paupart's ligament, and, as it were, within the abdomen. When we hear from a register of cases, in which this bold and judicious proceeding has been adopted, that out of twenty-two fifteen were cured †, we must dispel all fear about the limb being left without other adequate channels for the continuance of the circulation. Indeed, the numerous instances in which the external iliac artery has now been tied, fully warrant the conclusion, that the limb is not in more danger of mortifying after the ligature of this vessel, than after that of the femoral artery below the profunda; and the several opportunities which I have had of seeing the external iliac tied, have left not a doubt in my own mind that the success of the operation would have been still greater, had it been done in some cases at an earlier period, before the tumour had become very large, and the health materially impaired by long confinement. No doctrine, I think, is more pernicious than that which inculcates delay for the unnecessary object of giving the anastomoses time to enlarge: for these are always ready to do their office, if they be not prevented by the effects of the distention and pressure of a tumour of enormous dimensions. The truth of these remarks was strikingly displayed in the ever-memorable case of inguinal aneurism, in which the human aorta was tied: for, notwithstanding the ligature of this vessel above its bifurcation, the blood found its way with ease into the limb, which was not on the same side of the body as the disease; but, on this side, the same desirable circumstances seem to have been

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* Surgical Works, vol. i. p. 227, &c.

† Hodgson on the Diseases of Arteries, &c. p. 417.

impeded by the obstruction produced by the pressure and effects of the tumour.[*] In order to take up the external iliac artery, the integuments are to be divided in the direction which this vessel naturally takes in its descent to pass out of the pelvis. In an adult, the incision of the integuments is to begin half an inch below the superior spinous process of the ilium, and an inch and a half from the same process towards the linea alba. From the point here specified, the wound is to be carried down nearly as low as the femoral arch, but not lower, in order to avoid injuring the spermatic cord and epigastric artery. The aponeurosis of the external oblique muscle, at the bottom of the wound, is to be divided to the same extent. The point of the finger is then to be introduced into the lower angle of the incision, and under its guidance the layers of the internal oblique and transverse muscles are to be cautiously divided, particular care being taken not to hurt the subjacent peritoneum, which serious accident may be avoided by pressing this membrane a little back with the finger where it first makes its appearance under the divided aponeurosis of the transverse muscle. The finger will now be in immediate contact with the external iliac artery in the vicinity of the lower angle of the wound, and a little above the origin of the epigastric, at the exact point at which the former vessel rises from the side of the pelvis, to pass over the horizontal ramus of the os pubis[†], where it makes another turn to descend under the femoral arch to get to the bend of the thigh. At that point, a single ligature is to be passed with an eye-probe, or aneurism needle, under the artery, which is to be firmly tied. It is observed, that the situation of the latter vessel over the vein, at the point above described, is a circumstance facilitating very much the application of the ligature.[‡]

Of tying the internal iliac artery, a rare operation, I do not consider it necessary to treat in this elementary work, particularly as I should have nothing more to offer than what is already contained in the Dictionary.

MODE OF OPERATING FOR ANEURISMS AT THE BEND OF THE ARM.

Surgeons used always, until very lately, to deem it indispensably necessary, in operating for aneurisms of the brachial artery, to tie the vessel both above and below the swelling. They thought that one ligature above would not be sufficient, by reason of the freedom with which the blood would get into the sac, through the inosculations between the collateral and recurrent arteries. Scarpa, however, has explained, that one ligature above the tumour is quite enough. An incision is to be made along the inner edge of the biceps muscle, the sheath of the artery opened, and the vessel, after being separated from the median nerve, and two accompanying veins, tied with due firmness.

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[*] Surgical Essays by A. Cooper and B. Travers, p. 114, &c.

[†] Haller, Fasc. Anat. Arteriæ Pelvis, Tab. 1, 2. z. b., and Scarpa in Memoria sulla Legatura delle Principali Arterie, &c. p. 116.

[‡] Scarpa, p. 117.

When the aneurism of the brachial artery is diffused, and attended with violent pain and inflammation, Scarpa * advises the old operation of opening the tumour, taking out the coagulated blood, and tying the artery with two ligatures, one above, the other below, the opening in the vessel.

MODES OF OPERATING FOR AXILLARY ANEURISMS.

The sufficiency of the anastomosing vessels for the transmission of the blood, when a large arterial trunk is tied, appears now to have been exemplified in every situation, where the performance of such an operation is at all practicable. Not only may the external iliac artery be tied, without the circulation in the lower extremity being cut off, the subclavian artery may also be secured at the point where it first emerges from the chest, and yet the arm receive an adequate supply of blood. † Were it not for these well-established facts, patients with wounds and anenrisms of the axillary artery must be left to their fate.

In several of the operations, to which I have adverted below, I mean in those where the artery was tied by cutting

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* Anatomy, Pathology, and Surgical Treatment of Aneurism, transl. by Wishart, p. 356.

† For instances, in which the axillary or subclavian artery has been tied, refer to Keate's case in Med. Review and Magazine, 1801; Œuvres Chir. de Desault, par Bichat, t. ii. p. 554.; Maunoir, in Journ. de Méd. vol. xl. Mars, 1811; Colles in Edinb. Med. and Surg. Journal, No. 41.; T. Blizard in Hodgson's Treatise on the Diseases of Arteries; Chamberlaine in Med. Chir. Trans. vol. vi. p. 128, &c.; Post, in op. cit. vol. ix. p. 185. Ramsden in Pract. Obs. on Sclerocele and Aneurism. In some of these cases, the artery was tied by cutting below the clavicle; in others above it; the patients did not all of them recover, but the circumstances of the cases taken collectively exemplify the sufficiency of the anastomoses to supply the arm with blood, and that mortification will not follow, unless from some unfavourable complication, such as a very reduced state of the health; obstruction arising from the immense size of the tumour; an unnecessarily long and severe operation, &c.

below the clavicle, a large portion of the great pectoral muscle was divided, and this sometimes not in the most proper direction; indeed, in the case of a wound, where it is necessary to apply a ligature both above and below the aperture in the vessel, such proceeding must sometimes be indispensable for the purpose of ascertaining the exact point of injury. But, in an aneurism not extending too far inward, the following less severe method is practicable, though more difficult of execution.

An incision two inches and a half long is to be made through the integuments, a little below the clavicle, and immediately over the hollow between the deltoid and pectoral muscles. The axillary vein lies before the artery, and as a wound of it would probably be fatal, the utmost caution must be observed in the dissection. Care must also be taken not to mistake one of the cervical nerves for the artery. With an eye probe, a ligature is to be put under the vessel, as soon as it is distinctly ascertained to be such, and the vein and any adjacent nerve should be carefully excluded. No man ought to undertake this operation who is not a steady operator, and is not well acquainted with the anatomy of the parts.

Scarpa describes the method of operating below the clavicle as follows: the patient being seated with the shoulder somewhat depressed, an assistant standing behind is to hold him firmly in this position. The operator is to commence the incision in the integuments an inch from the sternal extremity of the clavicle, and to extend it along the lower edge of this bone towards the acromion, as far as the hollow between the pectoral and deltoid muscles. For the same extent he is then to detach the pectoral muscle from the clavicle, and reflect it a little, when the pectoralis minor will be found presenting itself, which, proceeding from the coracoid process, will be seen intersecting the lower, or external angle of the wound. The surgeon is now to insinuate the end of his finger between the point of the coracoid process, and the lower edge of the clavicle, where he will feel the exposed subclavian artery, surrounded by a part of the brachial plexus of nerves, and the subclavian vein.* The artery having been separated from these parts is next to be tied.† This mode of operating must be much more easy of performance than the foregoing, in which the surgeon would be embarrassed by the very limited point at which he could get at the artery.

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* The vein in front; the nerves behind.

† Scarpa, in Memoria sulla Legatura delle Principali Arterie, &c. p. 126. Pavia, 1817. A similar method of finding the subclavian artery was also described in Mr. C. Bell's Operative Surgery, vol. ii. p. 370. edit. 1.

When the aneurismal tumour extends far inwards towards the sternum, the only place where the subclavian artery can be taken up, is just where it emerges from the chest, from behind the anterior scalenus muscle, and the object can only be effected by cutting above the clavicle. On a dead subject, having no large aneurismal swelling, such an operation is much easier than on a living person, whose clavicle is pushed up by a vast tumour, so as to increase the distance, between the artery and the wound in the skin. In the case recorded by Mr. Ramsden, a transverse incision, about two inches and a half in length, was made along and upon the upper edge of the clavicle. The cut was begun on the side towards the shoulder, and ended about half an inch from the outer edge of the sterno-cleido-mastoideus muscle. This incision divided one small artery, which was immediately secured. The skin, above the clavicle, was then pinched up, and divided, from within outwards and upwards, in the line of the external edge of the sterno-cleido-mastoideus muscle, to the extent of two inches. The shoulder was now lowered, and the edge of the anterior scalenus muscle exposed. The artery was then distinctly felt, presenting itself from between the scaleni, and it was detached with the finger-nail, in order that the ligature might be passed round it. Here some considerable difficulty arose, as Mr. Ramsden was not provided with any kind of aneurismal needle, that would allow their points to be brought up again, in the very short curvature, which the narrowness of the space, between the rib and the clavicle, afforded. Though the ligature could be conveyed under the artery, it could not be got round the vessel. At length a probe of ductile metal was got under the arterv, and, by this means, a ligature was drawn under the vessel. The usual knot was then made. Though the patient only survived the operation five days, the case was interesting, because it fully proved, first, that the arm was duly nourished with blood, and suffered no diminution of its temperature, though the subclavian artery had been tied immediately it came out of the chest; secondly, that an artery so near the heart as the subclavian, could be rendered impervious by the ligature; for, on dissection, this vessel, where the cord was applied, was nearly divided through, while the two ends were found consolidated and closed. *

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* See Practical Observations on the Sclerocele, &c., by T. Ramsden, surgeon to Christ's Hospital, &c. Dr. Post, of New York, whose case is, I

The judgment that I formed from the observation of this case was, that, in all probability, a complete cure would have taken place, had the man chanced to submit to the operation before the tumour began to slough, and before his health was materially impaired; and had the operation itself been shortened and facilitated by the assistance of the needles represented in Mr. Ramsden's publication.

These instruments undoubtedly resemble, in principle, Desault's aiguille à ressort, which consisted of a silver sheath, one end of which was straight, and the other curved in a semicircular way. This sheath enclosed an elastic wire, one end of which projected a little beyond the bent end of the sheath, and had a transverse eye in it, for the reception of the ligature. The instrument being introduced under the artery, the sheath was kept fixed, while the elastic wire was pushed through it, till the transverse eye had ascended sufficiently to let the surgeon take hold of the ligature. This being disengaged from the instrument, the latter was withdrawn.* The needle, invented by Mr. Watts †, appears to me rather an improvement on Desault's, inasmuch as it is made to let loose the eye and ligature together, as soon as they are conveyed far enough round the artery; a contrivance likely to save some little trouble.

Aneurismal needles, made on the foregoing principles, must certainly afford great assistance, whenever the clavicle is raised by the swelling, as they obviate the chief difficulty, namely, that of getting the ligature quite round the vessel. It was this difficulty which baffled Mr. Astley Cooper in one attempt which he made a few years ago in Guy's Hospital. ‡

One of the cervical nerves may be mistaken for the subclavian artery, in consequence of the pulsation of this vessel being communicated to all the adjacent parts. I have seen a mistake of this kind actually made by very skilful surgeons.

Pelletan practised on the dead subject the following method: the head was turned to the opposite side, and the shoulder lowered as much as possible. An incision was then made

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believe, the only successful instance, in which the artery has been tied, by cutting above the clavicle, found it necessary to use an instrument calculated to facilitate the conveyance of the ligature beneath the artery. See Med. Chir. Trans. vol. ix. p. 188. It seems, however, that Mr. T. Blizard had no difficulty in applying the ligature with a common aneurism-needle. Hodgson, op. cit. p. 598.

[*] See Œuvres Chirurgicales de Desault par Bichat, tom. ii. p. 560, 561.

[†] See Plate 1. fig. 4.

[‡] See London Med. Review, vol. ii. p. 509.

along the neck, at the back of the sterno-cleido-mastoideus muscle, so as to bring into view the scaleni muscles. The anterior portion of these muscles being divided, a ligature was conveyed without difficulty under the subclavian artery, with the aid of an aneurismal needle, mounted on a handle, said by the French to have been invented by Deschamps.* With the exception of cutting the anterior scalenus, which seems unnecessary, Mr. Abernethy has demonstrated in his lectures a similar operation these many years past.

OPERATION PROPOSED BY DESAULT IN CASES OF TRUE ANEURISM, WHERE A LIGATURE CANNOT BE APPLIED ABOVE THE TUMOUR.

Before some of the facts, already noticed in this chapter, had been ascertained, inguinal and axillary aneurisms were deemed incurable by any surgical operation. Indeed, cases sometimes even now present themselves, in which, owing to the extent of the swelling, the boldest and most expert operator could not attempt to take up the artery in the ordinary method.

It was for such examples, that the great Desault proposed the scheme of cutting down to the artery, and tying it, immediately below the tumour. Desault conceived, that the circulation would then be carried on by the collateral vessels; that the blood in the aneurismal sac would coagulate, and in time be absorbed; and that the arterial tube would be obliterated from the ligature as high as the first collateral branch.

Desault laid much stress on the prudence of sparing, in the operation, every anastomosing artery; of making only a small incision; and of only making the attempt in cases where the sac and integuments were not too thin. The French surgeon Deschamps tried this operation for the cure of an inguinal aneurism, which, I may observe, would have admitted very well of the performance of Mr. Abernethey's more successful plan. The result of Deschamp's case was decidedly adverse to the efficacy of Desault's project, not so much on account of the patient's death, as because the aneurismal tumour afterwards continued to pulsate strongly, and underwent a more rapid enlargement. As for the patient's decease, I think it sufficiently accounted for by what he suffered in the two severe operations, to which he was subjected, and the loss of blood he sustained in the second one, the first was tedious, and by no means the simple operation, which Desault seemed to have had in contemplation.[*] Desault's suggestion has also been put in practice by Mr. A. Cooper, who, in a case of inguinal aneurism extending very high up, tied the femoral artery between the origins of the epigastric and profunda. The pulsation of the tumour continued afterwards, but the swelling itself underwent a considerable diminution. Unfortunately, however, the aneurism burst inwardly, and there was no opportunity of examining the body, the patient having died in the country.[†]

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* Clinique Chirurgicale, tom. ii. p. 86.

OPERATIONS, IN WHICH THE CAROTID ARTERY HAS BEEN TIED FOR THE CURE OF ANEURISMS, &C.

That the carotid artery might become obliterated, without any dangerous effect on the brain, and that an aneurism of the same vessel might undergo a spontaneous cure, was long since proved by the case related by Petit, who, on the patient's decease some time afterwards, found the right carotid oblitered from its bifurcation as far as the subclavian of the same side.[‡] But, besides this kind of obliteration by a process of nature, modern experience has evinced, that the carotid artery may be suddenly tied with a ligature, and thus rendered impervious, without any pernicious consequences on the brain. In one instance, indeed, where Mr. Abernethy was obliged to take up the carotid artery, the head seemed to be affected; but, then, the patient had lost an almost fatal quantity of blood; and had an immense lacerated wound of the neck, in consequence of being gored with a cow's horn. Perhaps, therefore, it might be more correct to refer the affection of the brain to these causes, than to the ligature on the carotid artery. We may, I think, make such inference with tolerable certainty, since it has now been repeatedly proved, that tying this vessel, even in the most sudden manner, occasions no dangerous consequences on the brain. Hebenstreit mentions a case, which he had met with, where the external carotid was wounded in the extirpation of a tumour; and the patient would quickly have fallen a victim to the hemorrhage, had not the surgeon instantly tied the trunk of the artery. The operation succeeded, and the patient lived many years * afterwards. After the battle of Waterloo, I assisted my friend Mr. Collier in taking up the carotid, for the purpose of suppressing a violent hemorrhage from a wound made with a lance, and extending from the angle of the jaw into the mouth. This operation had the most successful result. †

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[*] See Œuvres Chirurgicales de Desault, par Bichat, tom. ii. p. 568—580.

[†] See Hodgson on Diseases of Arteries, &c. p. 301.

[‡] Acad. R. des Sciences de Paris, an. 1765. See also a case of one carotid artery obliterated, and the other lessened in diameter, without apparent ill effects, as adverted to by Mr. A. Cooper, in the Medico-Chirurgical Trans. vol. i. p. 223.

Mr. Travers, surgeon to St. Thomas's Hospital, tied the carotid artery in a woman, who laboured under an aneurism by anastomosis in the left orbit, causing a protrusion of the eye from its socket, and attended with distracting head-achs. No alteration in the functions of the brain ensued; no hemorrhage arose on the separation of the ligatures; and the consequence was a cure of the tumour in the orbit, the violent pain in the head, and the exophthalmia. ‡

Mr. A. Cooper first tied the carotid artery for the cure of aneurism in the autumn of 1805 §, and although the patient afterwards died from the effects of inflammation of the aneurismal sac, and the pressure of the swollen parts upon the larynx, the case established the important fact, that the carotid artery might be tied, and the ligatures detached with safety, while no doubt existed as to possibility of a complete cure under more favourable circumstances. In the year 1808, the same eminent surgeon repeated the operation for the cure of a carotid aneurism, and the experiment was entirely successful, the patient being in the end freed not only from the aneurism, but from a violent habitual head-ach and other complaints, with which he had been afflicted. ||

The operation of tying the common carotid is performed by making an incision through the integuments of the neck, beginning just above the upper part of the sternum, and ascending for two inches, or a little more, by the side of the inner edge of the sterno-cleido-mastoideus. A wound of this length will be quite long enough to expose the sterno-hyoideus and sterno-thyroideus muscles. ¶ The patient's chin being now somewhat turned towards the diseased side, in order to

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* See his trans. of B. Bell's Surgery, vol. v.

† Med.-Chir. Trans. vol. viii.

‡ See Medico-Chirurg. Trans. vol. ii. p. 1. Also Dalrymple's very similar case, detailed in vol. vi. p. 111. of the same work.

§ Medico-Chir. Trans. vol. i. art. 1.

|| Op. cit. vol. i. p. 222—233. Other cases in which the common carotid has been successfully tied for the cure of aneurism, are recorded by Hodgson, in Treatise on Diseases of Arteries, &c. p. 329.; Dr. Post, in New England Journal of Medicine and Surgery, vol. iii. p. 205. Boston, April 1814.

¶ Scarpa, sull' Aneurisma, tav. 5. 98.

relax the sterno-cleido-mastoideus of that side of the neck, and the sterno-hyoideus, and sterno-thyroideus being gently pressed towards the trachea, the large internal jugular vein presents itself. This vessel on account of its magnitude, and its alternate expansion and subsidence, with each inspiration and expiration would retard the operation, were not the surgeon to get one of his assistants to push it towards the outside of the neck. Immediately under the internal jugular vein, the common carotid appears. The operator is then cautiously to make a small opening, about a quarter of an inch long, in the sheath of cellular membrane, which includes the artery. This proceeding enables him to separate the vessel from the par vagum, and to introduce a ligature under it with an eye-probe, or aneurism-needle. * In several of the instances, in which the carotid has been tied, two ligatures were used, and the vessel divided betwen them; but, I believe, little doubt is now entertained as to the preference, which should be given to the employment of only one, excepting in the case of a wound of the carotid, where two would of course be indispensable.

CHAP. XXVIII.

FRACTURES.

FRACTURES are of two principal kinds, viz. *simple* and *compound.*

By a *simple* fracture is implied, a division of one or more bones, without any external wound, caused by the protrusion of the ends of the fractured bones. By a *compound* fracture is meant a breach in the continuity of one or more bones, together with a laceration of the integuments, which laceration is caused by the protrusion of one, or both of the ends of the fracture.

To these divisions of the subject some add a third, calling that fracture *complicated,* which is attended with several breaches of continuity in the injured bone, and with the wound of any large nerve, blood-vessel, &c.

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* See Scarpa's Memoria sulla Legatura delle Arterie, &c. p. 129.

Fractures are also distinguished into *longitudinal*, *transverse*, and *oblique*, according to the direction in which they run.

SIMPLE FRACTURES.

The symptoms of fractures are exceedingly various, according to the bones which are broken; and, though almost all writers have indiscriminately mentioned loss of motion in the injured limb, deformity, swelling, tension, pain, &c. as forming the general diagnosis of fractures, yet it is easily comprehensible by any one acquainted with the structure of the body, that numerous fractures cannot prevent the motion of the part, nor occasion outward deformity; and every surgeon must know, that, though at first there may be pain in the situation of a fracture, no swelling and tension, excepting what may happen to arise from an extravasation of blood, can take place till after a certain period.

When, therefore, a limb is broken, and the event is not manifest from the distortion of the part, it is proper to trace with the fingers the outlines of the suspected bone, and, wherever any unusual pain occurs, or any unnatural irregularity appears, to try if no grating, or *crepitus*, can be felt, on endeavouring to make one end of the bone rub against the other. When the os humeri, or os femoris, is the subject of injury, a crepitus is felt almost as soon as the limb is touched, and in the case of a broken thigh, except when the fracture is of the transverse kind, there is always a considerable shortening of the extremity, caused by the action of such muscles as draw the leg and knee towards the pelvis. But, when there are two bones, as in the leg and fore-arm, and only one is broken, the other continues to prevent the limb from being shortened, and thrown out of its natural shape, so that a crepitus can onlybe felt by a proper examination with the fingers. I am aware, that considerable harm, and great unnecessary pain, have been occasioned in the practice of surgery by an over-officious care to feel the grating of fractured bones; and whenever the case is sufficiently evident to the eyes, I cannot refrain from censuring such practitioners as indulge their own ill-judged habits at the expence of torture to the unfortunate patient. A fracture is an injury that is necessarily attended with considerable pain and injury of the soft parts immediately around the broken point of the bone; the case is always followed by more or less inflammation, and its usual consequences, heat, tension, swelling, &c.; and to increase these evils by rough handling of the part, is, above all things, cruel, and, I would add, unsurgical.

In cases of fractures, the muscles of the limb are often affected with involuntary spasms, which put the patient to great pain, and when the thigh-bone or arm-bone, or both bones of the leg, or fore-arm, are broken, occasion great distortion, while the violence of each spasm continues.

The steps of nature, in the union of broken bones, are very similar to those which she pursues in the union of wounds of the soft parts. The vessels on the surfaces of the fracture, and those of the periosteum, and soft parts directly adjoining the injury of the bone, first effuse coagulating lymph. This gradually becomes vascular, and as its vessels acquire the power of depositing earthy matter, it is ultimately converted into new bone, termed *callus*, which becomes the bond of union between the two portions of the fractured bone.

In order that the first connecting substance may speedily become organized, and fitted for the formation of callus, nothing is so favourable as perfect quietude. Hence, the chief surgical indication in the treatment of fractures, after the ends of the bones are replaced, is to keep them perfectly motionless: nature completes the rest. Different bones require different lengths of time to become firmly united; the ribs and clavicle unite as soon as any; the os brachii is commonly tolerably firm in five weeks; but the bones of the leg and the os femoris, seldom become perfectly strong in less than six weeks. These calculations, however, refer to adults: for, in children, fractures are cured much more quickly than in grown up persons. The more vascular the bones are, the sooner is the union of their fractures accomplished.

GENERAL PRINCIPLES IN THE TREATMENT OF FRACTURES.

Relaxing such muscles, as have the power of displacing the ends of a fractured bone, materially facilitates the reduction. A proper position, indeed, is the first thing to be attended to in almost all cases, in which the broken extremities of the bone are not in even contact. The muscles are the powers which cause the displaced condition of the fracture, by drawing that end of the bone, which is most moveable, out of its proper position, in regard to that which is most fixed. Hence, in the extremities, the lower ends of fractures are those which are truly displaced by being drawn upward, or to one side, by the action of certain muscles, which have their origin and insertions both above and below the situation of the breach of continuity. The muscles, therefore, which have the power of displacing the lower ends of such fractures, are the powers which we ought principally to endeavour to counteract.

In oblique fractures, it is much more difficult to keep the ends of the bones in a proper state of coaptation, because two oblique surfaces make no mechanical resistance to that effect, (viz. the retraction of the lower portion of the broken bone,) which the strong muscles have a continual tendency to produce.

But, relaxation of the muscles, which have the greatest influence over a fracture, is not only to be observed during the time when the surgeon is setting the broken bone: it is to be strictly adopted throughout the whole cure, at least, until the two ends of the bone have become firmly united together. Were this plan not strictly followed, the fracture would very soon be displaced again by muscular action.

The principle, from which the utility of relaxing muscles in these cases arises, is the fact, that every muscle can only contract to a certain degree of shortness: and that in proportion as its origin and insertion become approximated, it loses both the power and disposition to act in an involuntary manner.

The reflecting reader may inquire what particular position can relax every muscle connected with a broken bone? The same position, which relaxes the flexors, seems to have quite an opposite effect on the extensors. The answer is, that no posture will completely relax every set of muscles in every instance; and, in this circumstance, the joints must be placed in the middle state, between perfect flexion and perfect extension, as in this manner, though complete relaxation is not effected, most of the muscles will not be in a state of tension. When, however, every muscle, having the power to displace a fracture, can be relaxed, the others, which have no power over the progress of the case, may be neglected, and the posture determined accordingly. Thus, in the fracture of the leg, where we cannot perfectly relax every muscle capable of disturbing the fracture, we place the knee-joint in the mid state, between perfect flexion and extension: but, in the fracture of the patella, where we can relax every muscle, which can resist the object of the surgeon, we regulate the posture, without any regard to muscles, which have no influence over the fracture.

In cases of broken thighs, where the impossibility of relaxing every muscle that has the power of disturbing the fracture is strongly exemplified, it was the practice of Mr. Pott to select also a half-bent position of the hip and knee-joints, in which state he conceived that less trouble was experienced in the management of the case, from the action of the muscles. It does not require, however, a powerful mass of muscular fibres to displace the fracture. Hence, though the half-bent posture may relax such muscles as have the greatest force, yet, if we leave a certain set of muscles unrelaxed, which, by their action, can draw the ends of the broken bone into a wrong position, I am afraid posture alone is not the great object to which every other consideration should be sacrificed. I am also the more persuaded of the truth of this remark from knowing that no position, no approximation of the origin and insertion of a muscle, can prevent those violent, involuntary spasmodic contractions, which we see daily take place in cases of fracture. We must then turn our minds to the improvement of our mechanical means for holding the ends of the broken bone steadily and evenly together. Unfortunately, in the case of a broken thigh, it is quite impossible to employ at once the bent position, which relaxes the most powerful and troublesome muscles, and use the kinds of apparatus, which are best calculated for keeping the ends of the fracture in a proper state of coaptation, and free from motion. In this kind of accident, the whole limb must be kept motionless by mechanical means; for, if we leave the knee unconfined, and the leg subject to frequent motion, as is actually the case in Mr. Pott's mode of treatment, how are we to expect that the fracture can continue undisturbed and undisplaced? In other examples, however, where position of the limb, and relaxation of the most powerful muscles, can be made to concur with the best mechanical apparatus for securing the ends of a broken bone from being displaced, I admit, that it is by these principles we should be governed.

The positions for particular fractures will be noticed in the second part of this work.

Having placed the ends of the fracture in as even a situation, in regard to each other, as the nature of the case will allow, the next object is to keep them securely and quietly in this state, until they have become firmly united.

In certain constitutions, almost all the muscles of the injured limb are continually acting in a violent, involuntary, and spasmodic manner, so that neither position, nor mechanical means, are effectual in preventing displacement of the fracture. Such patients, if young and robust, should be bled, and take an opiate as soon after the accident as convenient.

The mechanical contrivances, employed to give that degree of support to the limb, which the breach of continuity in the bone, or bones, has taken away, consist of instruments called splints, with which a kind of steady, unyielding case is formed for the limb. Splints ought to be made of strong materials, and of a sufficient length to reach beyond the two joints nearest the fracture, and they ought to be adapted in shape to the contour of the limb. They are generally secured with straps, or tapes.

Since splints, however, are hard, and would give pain, if firmly applied to the limb, without the intervention of soft materials, it is customary to place a piece of the emplastrum saponis immediately over a simple fracture, and to apply, what is termed, an eighteen-tailed bandage, between which latter and the splints are also interposed pads filled with tow, or any other soft substances. Compresses are generally placed in situations under the splints, where the pressure from these hard instruments is likely to give most pain.

When there is much swelling before the fracture is set, surgeons generally apply, for the first few days, cold water, or the lotio liq. plumbi acetatis, instead of a plaster, and the linen, employed for this purpose, may be kept sufficiently wet (without taking off the splints) by squeezing the water or lotion out of a sponge into the interspaces between them.

The great parade in making violent extension, in order to reduce fractures, is quite abandoned by the moderns. When the muscles are relaxed in a scientific manner, the ends of the fracture may, in general, be put into a state of coaptation with the greatest ease, and very little extension is necessary. Many fractures are not in the least displaced.

In general, fractures of the arm and fore-arm are firmly united in about a month; while those of the thigh and leg require about six or seven weeks. When the union does not take place, after a reasonable length of time, the surgeon should endeavour to ascertain the cause. This may sometimes be imputed, either to the ends of the fracture not being in apposition*; to the part having been moved and disturbed too much; to the advanced age of the patient; or to a general languor and inertia of the constitution.

In the first and second of these cases, the bone should be set again, and kept quite motionless. When the patient is very old, the use of splints is to be continued longer than in other cases, as, in such a subject, it is often several months before fractures are united. Tonic and cordial medicines may also be prescribed.

When several months have elapsed, without an union of the fracture being effected, and there is reason to apprehend the formation of an artificial joint, surgical writers join Celsus in recommending the ends of the broken part to be firmly rubbed against each other, with a view of making them inflame and grow together. On the same principle, some surgeons have allowed their patients, with broken legs, or thighs, confined in splints, to get up and walk about. As soon as the necessary irritation has been produced, the limb is to be kept motionless a sufficient length of time. *

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* A case of this kind is recorded in the Dictionary of Practical Surgery, art. Fracture.

If such plans fail, it has been proposed to cut down to the broken part, and rasp or saw off the ends of the bone, and then treat the case, like a recent compound fracture. The latter operation was first devised, and practised with success, by that excellent surgeon, Mr. Charles White, of Manchester, in an example, in which the humerus could not be united by ordinary methods; and scraping the fracture was successfully performed by the same gentleman for the cure of an old fracture of the tibia. †

I have seen the operation of sawing off the ends of a fractured humerus practised without success, in St. Bartholomew's Hospital. Richerand informs us, that, in the only instance, in which he has had an opportunity of seeing such an operation, the patient died on the sixth day. ‡

On the other hand, Mr. Charles White's cases are highly favourable to the practice. Mr. Rowlands of Chester, and other surgeons, have likewise found the operation answer. The latter gentleman performed it on the thigh-bone, by cutting down to the fracture between the rectus and vastus externus muscles, and placing a strong plate of tin under the ends of the bone, when the saw was used. It was found necessary to make a transverse incision through a great part of the vastus, in order to facilitate the removal of the lower end of the fractured part; but, though Mr. Rowlands succeeded in his objects, the case was attended with such difficulties, that he expresses himself to be undecided, concerning the propriety of advising the operation to be undertaken by others. §

During the last few years, trials have been made of Dr. Physick's practice, which consists in making the ends of the bone inflame and suppurate by the introduction of a seton through the fracture, and then applying splints. Dr. Physick thus succeeded in consolidating a disunited humerus. This plan, which is considered milder and safer, than turning out

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* See Cases in Surgery, by C. White, F. R. S. p. 75.

† See Cases, p. 69—79.

‡ Nosographie Chirurgicale, tom. iii. p. 39. edit. 2.

§ See Medico-Chirurgical Transactions, vol. ii. p. 47.

the ends of the fracture, and sawing them off, has been followed in London, with various degrees of success, by Mr. Brodie, Mr. C. Bell, Mr. Wardrop, &c.

COMPOUND FRACTURES.

A compound fracture is accompanied with a wound of the integuments, caused by a protrusion of the end of the broken bone.

When the wound is large and laccrated, when the bone or bones are splintered into several pieces, and when the neighbouring muscles have suffered a violent degree of contusion, the case must be considered as extremely dangerous.

A limb, in this condition, submitted to the inspection and judgment of the discerning and scientific practitioner, presents to him one of those urgent cases, in which he sees at once the necessity for immediate amputation. The accident is an analogous injury to a bad gunshot wound of the limb, with fracture, and the observations which have been made respecting the frequent danger of delaying the amputation of limbs, shattered by gunshot violence, are in every respect applicable to these very bad compound fractures, occasioned by other causes.

So great and considerable an injury, inflicted upon parts endued with life and sensibility, capable of inflammation, suppuration, and gangrene, cannot be expected to take place, without being followed by the most severe effects, both upon the limb itself and the constitution. Supposing, however, the bone to be less badly broken, and the soft parts not quite so much bruised, wounded, and torn, and no large artery lacerated, the case is then of a very different description; and resorting to so severe a measure as amputation, without having made any endeavour to save the limb, would be both rash and unjustifiable. Instead of this blameable practice, the fracture is to be immediately placed as nearly in its natural situation as circumstances will allow, and the wounded integuments brought nicely into contact by means of adhesive plaster, in order that the chances of a union of the wound by the first intention may be taken. Under favourable circumstances of constitution, and proper antiphlogistic treatment, the subsequent local inflammation will not be too extensive and high, to prevent the adhesive inflammation from uniting the external wound, and the sympathetic fever will be found to be proportionally moderate.

In all cases of compound fractures, in which an attempt is to be made to save the limb, the primary object to be aimed at, is to lessen the danger of the accident, by converting the injury, as speedily as possible, from the state of a compound to that of a simple fracture, by uniting the wound of the integuments. Sometimes the plan succeeds, and a very important step is gained. In some instances, only a partial union follows; while, in others, where the contusion and laceration of the soft parts are more severe, the design, unfortunately, altogether fails.

When the local violence is followed by higher inflammation, when the wound does not unite by the first intention, and suppuration is the consequence, a considerable degree of sympathetic fever generally follows, and very great powers of constitution will be necessary to bear all the irritation consequent to the injury, and the copious discharge likely to come from the wound for a great length of time. Sometimes, in this state, the constitution, impaired and weakened by the local disease, is attacked by hectic symptoms; fresh irritation occurs about the fracture; large suppurations take place under the fascia, and require to be opened; and the patient is at length brought to the lowest condition of weakness, from which nothing can extricate him, except the removal of the limb, which operation is also itself uncertain in its issue. At other times, the patient's constitution holding out, the suppuration in the wound is soon accompanied with the formation of granulations, and cicatrization follows.

Let us consider a third case, in which the violence done to the limb has been more severe, so as to be followed by a speedy mortification of the whole extremity, and death of the patient. Here, perhaps, had the limb been sacrificed, and amputation been performed immediately after the receipt of the accident, the patient's life might have been preserved. But, as soon as the rapid symptoms of gangrene have made their appearance, amputation is generally too late; and though it may be a question, whether we ought not in some of these cases yet to amputate, on the principles explained in the chapter on mortification, the inferior chances of recovery which the patient now has is proved by manifold experience. Hence arises the absolute necessity of determining *primâ facie* the propriety or impropriety of attempting to preserve a limb with a compound fracture. In cases of compound fractures, there are two points of time when the surgeon has it best in his power to decide, whether it is most advisable to try to preserve the limb, or to sacrifice it for the sake of the patient's life. The one is immediately after the occurrence of the accident, and before an inflammatory and gangrenous tendency in the limb has had time to form. The other is after the subsidence of the first inflammatory symptoms consequent to the injury, when the constitution seems incapable of bearing any longer the great irritation and immense discharge from the wound, and when hectic fever seems more likely to close the patient's existence, if a further perseverance in an attempt to save the limb be made, than that the object in view should be accomplished.

The treatment of a compound is similar to that of a simple fracture, only a more rigorous attention to quietude and diet is necessary on the part of the patient, and a more vigilant care on the part of the surgeon. The posture of the limb must generally be regulated by the same considerations as in the case of a simple fracture; the fracture, if displaced, must be reduced as speedily as possible; the limb must be laid upon a splint, long enough to keep steady the two nearest joints, and having upon it a soft pad, filled with tow, and an eighteen-tailed bandage. The wound must then be approximated, to give it an opportunity of re-uniting by the first intention, which, when it happens, is a most desirable circumstance, as the fracture is immediately converted into a simple one. When the wound suppurates, it must have such dressings as circumstances require, care being taken, that at each application of them the fracture be disturbed as little as possible.

Though in the early stage of compound fractures one might generally be induced to have recourse to phlebotomy, as one of the best means for preventing much inflammation, it is found by experience, (at least in London,) to be ultimately prejudicial. Here the use of the lancet is thought to weaken the constitution too much, and incapacitate the patient to bear the very long and copious discharge of matter, which often ensues. It is also a commonly received opinion, that compound fractures do so much better in the country than in this large metropolis, and patients bear so much better the rigorous employment of antiphlogistic measures, that it is right to attempt the preservation of numerous limbs out of town, which in London would require amputation.

CHAP. XXIX.

DISLOCATIONS.

WHEN the articular surfaces of bones are thrown out of their particular places, the accident is termed a *dislocation*, or *luxation*.

Dislocations are divided, like fractures, into two principal kinds; viz. *simple* and *compound:* simple, when there is no external wound communicating with the cavity of the dislocated joint; compound, when the injury is attended with a wound of this description. Luxations have also been distinguished into *ancient* and *recent ; complete* and *incomplete ; primitive* and *consecutive*.

Such joints, as admit of extensive and various motions, are generally the most liable to dislocations; as, for instance, the shoulder, and other orbicular articulations. In the ginglymoid joints, which only move in two opposite directions, luxations happen with much less frequency, and, when they do occur, are for the most part incomplete; that is to say, the surfaces of the joint, though displaced, are not wholly separated. In these joints, the articular surfaces are large, and mutually adapted to each other, while the ligaments, holding them together, are numerous and strong. If we put out of consideration partial dislocations of the astragalus from the os naviculare, we never meet with what have been termed *incomplete* luxations, except in ginglymoid joints, like the ankle, the knee, and the elbow.

The distinctions *primitive* and *consecutive*, much adopted by the celebrated Desault, are highly necessary in considering the nature of dislocations; for, the practitioner should understand well, that when the head of a bone has entirely escaped from the articular cavity, it may afterwards have its situation materially altered by the action of the muscles. When it remains in the place, into which it was originally forced, the luxation is called a *primitive* one; but *consecutive* when the head of the bone has been drawn by the muscles out of the situation into which it was first thrown.

The diagnostic marks of dislocations chiefly consist of circumstances arising from the functions of the affected joint being interrupted; and the lodgement of the articular extremity of a bone in an unnatural situation, and among parts which it compresses and renders painful. Hence, there is a diminution or loss of motion in the joint; the limb or part is either shortened, lengthened, or distorted to one side, according to the kind of dislocation; the form of the joint is altered; the natural prominences of bone either disappear or become less conspicuous, as the trochanter at the hip; or the reverse may occur, as in dislocations of the shoulder, where the acromion projects more than usual. * The pressure of the dislocated head of the bone on the surrounding parts causes great pain, which is immensely increased when the surgeon moves the limb in order to examine the case, extreme agony, and an obstinate and even incurable paralysis being induced, when a large nerve is thus compressed and injured. Nay, the pressure of the head of a dislocated bone upon important organs may endanger life; and Mr. A. Cooper has recently recorded one instance, which was communicated to him by Mr. Davie of Bungay, where such danger arose from the pressure of the sternal end of the clavicle upon the œsophagus. In thin subjects, before inflammation and swelling have had time to come on, the head of the dislocated bone may sometimes be distinctly felt, forming a preternatural tumour or projection, while, in the situation of the articular cavity, there is an unusual depression, or want of fulness in appearance. As Mr. A. Cooper has correctly remarked, a considerable degree of motion sometimes continues for a short time after the accident. A man dislocated the head of the thigh-bone upon the obturator foramen; the thigh could at first be moved about with freedom; but, in less than three hours, the head of the bone became firmly fixed in its new situation by the contraction of the muscles. †

A good deal of swelling generally follows a dislocation, and this sometimes very quickly, especially, when the violence has been considerable, and a quantity of blood is extravasated in the cellular membrane. However, in simple dislocations, which have been reduced, the ensuing inflammation but rarely ends in suppuration; though so far is the thing from never taking place, that two fatal instances of it after the reduction of a dislocated hip, are mentioned in the essays, which are cited below.

Luxations are almost always produced by external violence, by which such ligaments are torn as naturally restrain the dislocated heads of the bones from being thrown into the particular directions in which, in the various cases, they are found to be

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* A. Cooper, in Surgical Essays, part i. p. 4. 8vo. London, 1818.

† Op. cit. p. 5.

situated. Even tendons, proceeding over the surface of the joints, are frequently lacerated. According to the investigations of Mr. A. Cooper, the capsular ligament is torn to a great extent transversely; the particular ligaments of joints, as the ligamentum teres of the hip, is torn through; but, in dislocations of the shoulder, he has not found the tendon of the biceps broken, though he will not assert, that it never happens. He describes the tendons, which cover the ligaments, as being also torn, particularly, the tendon of the subscapularis muscle, when the head of the humerus is thrown into the axilla. Some of the muscles are very much shortened, while others are upon the stretch, as is the case with the psoas and iliacus internus in dislocations of the thigh-bone downwards. A considerable laceration of muscles now and then occurs, as of the pectineus and adductor brevis, in the latter kind of luxation.*

Dislocations may be accompanied with fracture: in those of the ankle, the fibula is mostly broken; at the hip, the acetabulum is sometimes fractured; and in the elbow, the coronoid process of the ulna often suffers.

In the ginglymoid articulations, external violence alone commonly operates in causing a luxation, which at the same time is generally incomplete. But, in the orbicular joints, the action of the muscles has constantly a share in occasioning the accident, which, we know in these articulations, is invariably complete. Indeed, in the dislocation of the lower jaw, external violence generally has no concern at all in the production of the accident, the bone being displaced entirely by the action of the muscles.

Besides the ordinary occasional causes of luxations, it seems proper to mention those, which are called predisposing, and which are either natural, or accidental. The natural are; the joint admitting of great latitude of motion; the small extent of surfaces, by which the bones touch each other; the laxity † and small number of the ligaments uniting them; the shallowness of the articular cavity, &c. The accidental predisposing causes are, paralysis of such muscles as tend to strengthen the joint; a preternatural looseness of the ligaments, &c. Thus, Boyer mentions a case, where the deltoid muscle being paralytic, the weight of the arm was alone capable of dislocating the humerus from the scapula; and the same writer adverts to a woman, who could not yawn even moderately, without her jaw being luxated, in consequence of a looseness of the * ligaments. If, says Mr. A. Cooper, muscles are kept extended for a length of time, and their tone is destroyed, or if from a paralytic affection, they lose their action, a bone may be dislocated easily, and as easily replaced: an observation, which he exemplifies by cases, of which my narrow limits preclude the details. †

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* A. Cooper in Surgical Essays, p. 5. and 6.

† A young girl brought up to tumbling, who went to consult Mr. A. Cooper, used to have the patella laid flat upon the outside of the external condyle of the femur, by the action of the rectus muscle; in consequence of the lax state of the ligaments.

In luxations, the degree of danger is very much altered by the case being simple or compound. Simple dislocations, when recent, may commonly be reduced with facility, and cannot be reckoned generally dangerous. On the other hand, compound dislocations of large joints, like compound fractures, are frequently attended with considerable danger; and the same nicety of judgment is requisite in determining whether amputation ought to be immediately performed, or an effort made to preserve the limb, as in these other cases. Most of the remarks, therefore, which were delivered in the preceding chapter, in relation to compound fractures, are equally applicable here. The degree of violence and laceration done to the soft parts, the great or little chance of healing the wound by the first intention, and the youth or advanced age of the patient, are circumstances, which ought to influence the judgment in this difficult part of surgery. In the country, also, many cases would recover, which in town would not do so, without amputation.

Dislocations of orbicular, are reckoned less dangerous, than those of ginglymoid joints. In the former, the action of the muscles has a great share in producing the accident, and the soft parts are generally less injured. But, even in joints of the same kind, the extent of the evil is measured by the largeness of the articular surfaces, and the number and strength of the muscles, and ligaments. Hence, luxations of the elbow and wrist are generally less hazardous, than those of the knee and ankle, the production of which last cases requires the operation of greater violence.

Though luxations of orbicular joints are generally not so dangerous as those of ginglymoid articulations, they are more difficult to reduce, because the muscles, resisting the aim of the surgeon, are more numerous and powerful.

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* See Boyer's Lectures on the Bones, by Richerand, transl. by Farrell, vol. ii. p. 38, 39.

† Surgical Essays, p. 10.

The indications, in the treatment of dislocations, are, to reduce the displaced articular surfaces as speedily as possible, and to support the joint with bandages, or splints, until the lacerated ligaments, tendons, &c. have had an opportunity of uniting.

The chief difficulty in the reduction of dislocations, arises from the resistance which the muscles make by their contraction, and which, for a certain period after the accident, increases in proportion to the length of time during which the bone remains unreduced. As Mr. A. Cooper correctly observes, when a bone is dislocated, the muscles draw it as far from the joint as the surrounding parts will allow, and there by their contraction they fix it. The business of the surgeon is to counteract this resistance. If extension be made almost immediately after a dislocation has happened, the resistance of the muscles is easily overcome; but, if the operation be deferred only for a few days, the utmost difficulty is *experienced. That the action of the muscles forms the principal impediment to reduction is proved, first, by the facility of putting the bone back into its right place in cases where the muscles are in a state of paralysis; secondly, by the same facility which occurs when the patient happens to be debilitated by intoxication and faintness from any cause whatsoever. Thus, Mr. A. Cooper mentions a case of injury of the jejunum, and dislocation of the hip, where the muscles scarcely made any opposition to the endeavours of the surgeon.

These facts furnish useful suggestions in practice, teaching us not only how to avail ourselves of any accidental swooning, or syncope, to replace the bones, but also how to adopt means for the express purpose of inducing faintness, great momentary debility, and universal muscular relaxation. These means are bleeding from a large orifice, nauseating doses of tartarised antimony †, the warm bath, opium, &c. In strong, athletic subjects, the utility of such practice is daily seen; and if there remained any doubt about it, the manner in which it has been lately recommended by that judicious and experienced surgeon, Mr. A. Cooper, ought to produce conviction. In fact, the cases which that gentleman has published completely prove, that when this method is neglected, the most powerful mechanical means sometimes fail. One excellent principle in the employment of mechanical force is to begin with it gently, continue it unremittingly, and increase it very gradually. The propriety of attending to this principle depends upon the fact,

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* Surgical Essays, part i. p. 20.

† A. Cooper, op. cit. p. 22.

that the muscles are more certainly overcome by long-continued, gradual extension, than by short, interrupted, numerously repeated exertions of great sudden violence. When the muscles are opposed in this last injudicious manner, it requires an immense time to fatigue them effectually, and the sudden violence is more likely to tear the flesh, than reduce the bone.

In reducing dislocations, counter-extension is to be made; that is to say, the bone, with which the luxated one is naturally articulated, is to be fixed, and kept back while the extension is practised. The necessity of fixing the scapula and clavicle in dislocations of the humerus; and the pelvis in luxations at the hip; is too obvious to require any comment. In making the counter-extension, however, one essential caution is requisite; viz. never to make pressure exactly on the articular cavity, or any point between it and the head of the bone, as thus a great obstacle to the reduction would be created.

The extending force may be made either with towels, sheets, &c. put round the limb, and pulled by a sufficient number of assistants, or with what is better, multiplied pulleys. The French (as I think) rightly prefer applying the extending force as far as they can from the luxated head of the bone; but, in this country, the plan of applying the towels, pulleys, &c. to the lower end of the dislocated bone itself is mostly practised. In luxations of the hip, Mr. A. Cooper applies the extension just above the condyles of the femur; in dislocations of the shoulder, he makes extension at the wrist, placing the heel in the axilla, and drawing the limb in a line with the side of the body; in which position, the pectoral and latissimus dorsi muscles are relaxed.*

In order to facilitate the reduction, it is always necessary to consider what muscles have the power of opposing our attempt to bring the dislocated head of the bone into its proper place, and these, if possible, should be relaxed at the time when the extension is made.

The position in which the limb ought to be placed, until the ligaments have united, must generally be determined on the same principles as in cases of fractures; and sometimes by a knowledge of those positions, in which the part can never be luxated. Thus, the hip can never be dislocated, while the knees are confined together; nor the jaw, while the mouth is kept shut. Dislocations, however, when reduced, can generally be kept right with less trouble than fractures, except when the bone has been repeatedly out of its place, and the muscles are paralytic, or the ligaments preternaturally loose.

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* Surgical Essays, vol. i. p. 25.

The modes of reducing particular luxations will be noticed hereafter.

In compound dislocations, it is a most important point to obtain a prompt union of the wound, as the injury is thus at once converted into a simple case. Therefore, as soon as the bones are reduced, the lips of the wound are to be accurately brought together with sticking plaster, and the joint kept perfectly quiet in splints.

In compound dislocations of the ankle, it must be exceedingly bad practice ever to saw off the protruded end of the bone, as it may always be replaced. What good the proposers of this plan have in view is difficult of conception. Mr. Gooch was inclined to think such practice more likely to be followed by success, when the head of the bone had been long quite out, and exposed to the air. * But no surgeons of the present day ever delay the reduction until the bone can be materially affected by exposure. An eminent surgeon in London, who sometimes follows the practice, assigns as a reason for it the avoidance of tetanus; but yet this ground cannot be sufficient, because, though the method is never adopted in St. Bartholomew's Hospital, tetanus is very rarely seen there after compound dislocations. I much regret, that Mr. Hey has given the least countenance to so objectionable a method: in fact, the only instance of it, adduced from his own practice, is, in my opinion, strongly against it, the patient, after the cure, being able to walk but slowly, and weakly, with his toes turned outwards. † This gentleman's use of sutures, in these cases, is also to be condemned.

Old luxations can hardly ever be reduced; for, not only the muscles become permanently shortened, and the articular cavity more or less obliterated, but the head of the dislocated bone acquires adhesions to the parts in its new situation; and is sometimes so confined by a new bony socket, that nothing but the fracture of this part could allow the head of the bone to change its situation again. ‡

Though dislocations are commonly occasioned by external force, they are, now and then, the consequence of disease in the joints. Every surgeon knows, that a luxation of the thigh-

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* Cases in Surgery, p. 103. edit. 1.

† Pract. Observations in Surgery, p. 375. edit. 2.

‡ See A. Cooper on Dislocations, in Surgical Essays, vol. i. p. 21.

bone is often caused, in the disease of the hip, by the destruction of the acetabulum, and articular ligaments. Sometimes the ligaments become greatly relaxed after an accumulation of synovia in the joints. When the knee-joint has been distended with such fluid, the patella is sometimes dislocated by the common efforts of the muscles in walking, as soon as the redundant secretion is absorbed. * We do not often see a dislocation take place in cases of white swellings of the knee; but it does occasionally occur. Mr. Lawrence once informed me, that he had seen a child, whose bones of the leg were drawn considerably upwards towards the tuberosity of the ischium, in consequence of disease in the knee; and since this observation was communicated to me, I have met with two or three examples of the same kind. In the museum of St. Thomas's Hospital, there is a preparation of a knee dislocated in consequence of the destruction of the ligaments by ulceration: the bones of the leg are anchylosed at right angles with the femur, and turned directly forwards. †

I once saw, with the above gentleman and Mr. Langstaff, a person afflicted with a diseased knee, whose affected joint could be bent to a very great extent towards each side, and this even when the leg was brought completely forward.

The pressure of the dislocated head of a bone sometimes gives rise to œdema and paralysis of the limb. Desault met with several dislocations of the shoulder, in which palsy of the arm was occasioned by injury of the axillary plexus of nerves. Some of these paralytic affections proved incurable; others yielded to the application of the moxa above the clavicle, or to the employment of strong ammoniacal liniments. ‡

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* See case in Mr. A. Cooper's Surgical Essays, p. 9.

† A. Cooper, op. cit. p. 11.

‡ See Œuvres Chir. de Desault, par Bichat, tom. i. p. 355—357.

CHAP. XXX.

OF SYPHILIS; OR, THE VENEREAL DISEASE.

GENERAL OBSERVATIONS.

THE venereal disease is the consequence of a specific, morbid poison, which, being applied to the human body, produces effects, either on the part to which it is immediately applied, or on various parts of the system, in consequence of absorption.

Though we see the operation of the venereal poison in the human body daily exemplified, we remain in perfect ignorance in respect to its general properties. Our want of information on this subject, however, is the less to be lamented; because, even if we had it in our power, in consequence of this knowledge, to introduce such remedies into the system as would completely neutralize the syphilitic poison out of the body, still, if the Hunterian doctrines be correct, our projects would fail. The practice would be ineffectual, because the mere contact of the virus is supposed to be sufficient for the future production of the malady; the poison, when once introduced into circulation, is conceived to produce a disposition to the disease in such parts as are susceptible of being affected; and, after the disposition is formed, the disorder it is alledged must follow, even though every atom of the poison be expelled from the system; the number of parts affected depending on circumstances which have not yet been explained.

How long the venereal disease has existed in the world, is a very undetermined question. Several writers have endeavoured to prove, that its antiqnity on the old continent is very great; but the opinion commonly adopted, (though as it seems to me without sufficient foundation,) is that supported by the learned Astruc*; viz. that the disorder was first imported into Europe, from the West Endies, by the followers of Columbus, towards the close of the fifteenth century; and that in Europe it first broke out to any great extent in the French army at the famous siege of Naples, in 1494.

The partisans of these last sentiments, however, do not deny, that discharges from the genitals, sores on these parts, and various eruptive complaints, have affected the human race from time immemorial, as a variety of passages in ancient authors fully prove; but it is argued that syphilis cannot be as ancient as the time of Moses, or the days of the Greeks and Romans. If these last had been acquainted with lues venerea, it is thought that their licentious poets, especially Horace, Juvenal, Perseus, and Ovid, would not have been silent on a subject so perpetually occurring in the satirical writings of Pope and Swift. *

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* De Morbis Venereis.

I shall now endeavour to lay down the leading and most interesting general opinions, concerning the nature of the disease at present engaging our notice; and it appears to me, that the most advantageous way of doing this, will be to review the fundamental doctrines of the late Mr. Hunter. A few things, however, must first be premised, for the instruction of the student.

The effects produced on the part, to which the venereal poison is directly applied, are called *primary symptoms;* while those happening in consequence of the virus having been absorbed into the circulation, are termed *secondary.*

When the primary symptom is a sore, it is denominated a *chancre;* and when the absorbed matter, in its course towards the circulation, makes the absorbent vessels or glands inflame and suppurate, the latter complaint is named a venereal *bubo,* which likewise generally ranks as a primary venereal symptom, because it is caused by the virus, while this is only on its way into the circulation, and is not in reality an effect of the poison being actually blended with the blood.

According to several authors, and amongst them is Mr. Hunter, the primary symptom may be a discharge of venereal matter from the urethra, or from the surface of the nymphæ clitoris, meatus urinarius, &c. in women, well known by the name of a *clap* or *gonorrhœa.*

The earliest or first order of *secondary symptoms* generally consist of ulcers in the the throat or skin, or of spots on the surface of the body. The later order of secondary symptoms are, either swellings of the bones, periosteum, and tendons, called *nodes*, or else mere pains in these parts.

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* The determination of these points is now involved in great obscurity. The existence of the venereal disease in the sense received by many writers begins at the present day to be doubted; I mean a distemper corresponding altogether to Mr. Hunter's description of it, and absolutely requiring mercury for its cure. Until the exact nature of the disease can be determined, and accurately defined, it would be idle to waste time in endeavouring to ascertain the precise period of its first origin. For an account, however, of various arguments tending to prove the antiquity of diseases strongly resembling the venereal, and to refute the idea, that syphilis was brought to Europe from America, or that the contagious disease, which broke out at the siege of Naples, resembled the venereal, see Robertson's Hist. Enquiry into the Origin of the Venereal Disease, in London Med. Repository, vol. ii. p. 112. and 185.

In the opinion of Mr. Hunter, gonorrhœa and chancre arise from the application of the same specific virus.

The difference of the effect is attempted to be explained by the application being made, in the first instance, to a secreting surface, and in the second, to a non-secreting one.

On the other hand, the best practitioners of the present time do not believe in the identity of the infections which give rise to these two very different cases; because gonorrhœa can be entirely cured without mercury; because it has prevailed from time immemorial, and, on that account, was never regarded by the first observers of syphilis, as being at all connected with the new distemper; because it is questionable, whether secondary symptoms ever actually proceeded from gonorrhœa; and lastly, because B. Bell and others have not been able to cause either a chancre, or secondary symptoms, by inoculation with gonorrhœal matter, as Hunter is represented to have done; nor gonorrhœa by the insertion of syphilitic matter within the the urethra. As some reflections on this point are contained in the chapter on gonorrhœa, I shall merely add my own belief, in this place, that gonorrhœa and chancre do not depend upon the same virus.

Mr. Hunter believed, that the syphilitic poison arose in the human race, since it appears to be incapable of exerting its specific effects on any other animals. He also concluded, that it must have been originally formed on the genitals, as, in all probability, had it been first lodged on any any other part, its effects would have been confined to the individual first affected.

The disease cannot be imparted through the medium of the atmosphere; but only by the poison being actually placed in contact with the human body.

We are quite ignorant what the venereal poison itself is in an unmixed form; and, perhaps, it never exists, except as blended with pus, or some other secretion, which is generally, though not always, the product of inflammation.

According to Mr. Hunter, the application of venereal matter commonly gives rise to inflammation, followed by a discharge from secreting surfaces, and by ulceration on other parts. It is acknowledged, however, that inflammation is not invariably produced by the application of the virus. He states that the matter, formed and secreted by chancre, gonorrhœa, and even by a bubo, is of the same specific quality as the matter first applied, and contains the venereal poison, which is generated by the peculiar action of the affected vessels, which action is superadded to that occasioning ordinary suppuration.

Mr. Hunter thought, that the number and virulence of the symptoms were not at all influenced by the quantity of the poison absorbed, nor by its being more or less diluted.

Although the matter of *primary* venereal complaints, viz. of chancre, bubo, and, according to Hunter, of gonorrhœa also, contains the venereal poison, and can communicate the disease to others, the matter of all *secondary* venereal complaints does not contain the specific virus, nor, of course, possess the property of being able to impart the distemper to others. Neither is the blood, nor any of the secretions, of a venereal patient, possessed of such quality.

After the venereal virus has been conveyed into the circulation by the absorbents, Mr. Hunter inferred, that it did not long continue there, but was soon ejected, together with some of the excretions. Previous to its expulsion, however, it contaminates certain parts of the body, and gives them a *disposition* to the disease. Mr. Hunter's chief reason for supposing, that the virus does not remain long in the circulation, is that, when the parts, first affected with secondary symptoms, have been cured, before the disease is eradicated from such parts, as are generally affected with secondary symptoms at a later period, the first parts which have been cured, never again become diseased *from the same stock of infection*, as, in all probability, they would do, if the virus continued mixed with the circulating fluids.

The reasons why the virus, after being absorbed, is sometimes expelled again, without leaving, in any parts whatsoever, a disposition to the disease, or in other words, any contamination, are not very well solved by the Hunterian theories. Neither do they explain to us, why the number of parts, to which the disposition is communicated, by the absorption of the virus into the system, should vary so considerably, as we find happens in different examples. Mr. Hunter, indeed, assigns to mercury the power of *preventing* the formation of the disposition; but, then, he represents the presence of the virus in the constitution as being so transient, and the disposition to the disease as being produced so nearly about the same time in whatever parts are contaminated, that, in a multitude of cases, the supposition, that mercury has been given in time enough to *prevent* the disposition in all or some parts, is altogether inconsistent with the foregoing principles.

But, though Mr. Hunter believed, that the *disposition* was formed nearly about the same time in such parts as happen to be contaminated; yet, his doctrines teach us, that they fall into a state of palpable disease, or (to use his own language) they afterwards take on the diseased *action* at different periods, some shewing much sooner than others the local effects of the disease. This remarkable circumstance in the history of syphilis, Mr. Hunter endeavours to account for, partly by the different susceptibility of action in different organs, and partly by the effect of external circumstances, having no relation to the poison or the constitution.

Of these external circumstances, one of the principal is cold, which accelerates the local effects caused by the passage of the virus through the system. The change from *disposition* to *action* appears also to be hastened by proximity to the surface of the body, and by any great disturbance in the habit from scrofula, gout, rheumatism, and, more especially, fever.

It was likewise one of Mr. Hunter's tenets, that the change from disposition to action never happened while the constitution was under a mercurial irritation.

He inculcates, that, when the disposition has taken place, the action may be suspended by mercury; but the disposition will remain, and the action shew itself at some period after the mercurial irritation has ceased. But, although mercury cannot destroy a disposition already formed, it may hinder the disposition from being formed at all, or, in other words, prevent contamination. When the action has begun in one order of parts, it may be cured, and will not return in the part, or that order of parts, from the same stock of infection. But the diseased action may take place in another order of parts, if that other order has been contaminated; and, in this order, it must be treated as in the former. When the diseased action has taken place, and been cured in the part first affected, in the throat and fauces, the skin and the bones, or periosteum, the patient may be regarded as free from the disease, as far as our knowledge has hitherto traced it.

The usual time of the skin, or throat, taking on the diseased action, is, on a medium, six weeks after the mercurial irritation, that cured the first symptoms, has subsided, and in the bones, about twice that time; but these intervals between the primary and secondary symptoms are subject to much variety.

Whatever doubtful appearances may arise in the skin, throat, or bones, during the mercurial irritation under which chancres or buboes are giving way, they are not venereal; and even if such secondary symptoms occur, after that mercurial irritation has ceased, but earlier than the usual periods above specified, they are not to be regarded as unequivocally syphilitic. If no secondary symptoms appear in three months after the mercurial irritation has ceased, and the constitution has not, in the mean time, been occupied by any other disease, we have, for the most part, no reason to apprehend any complaints in the skin or throat from that stock of *infection.

That there are some glaring inconsistences in Mr. Hunter's precepts, with regard to the venereal disease, I think no man of common sense or candour will deny. One of the most striking incongruities is Mr. Hunter's asserting, that mercury cannot cure the disposition, and yet, by way of security, prescribing mercury, in his practice, a certain time after all existing palpable systems had been cured.

The employment of this ambiguous term, *disposition*, and the theories connected with it, have in particular been the subjects of criticism. It has been contended, that we have no proof whatever of the existence of the state, which Mr. Hunter implies by disposition. If, observes an anonymous writer, after a certain course of mercury, and the consequent removal of a chancre, blotches should appear, then, says Mr. Hunter, a disposition had been formed, which no quantity of mercury could have destroyed; but may we not, with at least equal probability, say, that in such cases mercury had been insufficiently used? If, on the other hand, after such a course, no blotches should occur, the friends of the doctrine tell us, that the secondary order of parts had not been contaminated; but in this case it may also be said, that the mercurial course had been judicious and efficient.†

Throughout Mr. Hunter's writings, we are taught to believe, that it is the invariable character of all really venereal complaints to become progressively worse, and never undergo any amendment, unless mercury, the specific remedy, be exhibited. Thus, chancres on the penis, and ulcers in the throat, are described as constantly growing worse, without the aid of mercury. In the last edition of this publication, I expressed doubts concerning the veracity of this doctrine, and mentioned the subject as deserving further investigation, because of infinite importance in relation to practice. In that edition, printed in 1813, I remarked, that, if a sore put on a healing appearance, without the aid of mercury, we were directed by some surgeons to infer, that the complaint was not venereal. In many doubtful cases, we were advised to defer the employment of mercury, for the purpose of judging of the nature of the disease by the foregoing criterion. But, on the other hand, is it not a fact, that primary venereal symptoms will *sometimes* yield to several medicines besides mercury? The mass of evidence in favour of the nitrous and muriatic acids, the oxymuriate of potassa, &c. being in a certain degree anti-venereal, is weighty and [*] respectable. I do not wish to insinuate, that these remedies can be depended upon as much as mercury; but only that they possess considerable power over syphilis, and will sometimes make chancres, venereal ulcers in the throat, &c., give way. Mr. Pearson, as having held the situation of surgeon to the Lock Hospital a considerable time, is looked up to by many quite as an authority on the present subject. Does not this gentleman distinctly allow, that guaiacum and sarsaparilla are capable of alleviating symptoms derived from the venereal virus, though not of eradicating the disease? [†] Does he not state, that even bark will sometimes have a salutary effect on incipient buboes, ulcers of the tonsils, and gangrenous sores, from a venereal cause? Does he not mention the almost complete reduction of venereal buboes by this [‡] medicine? Has he not found that the carbonate of ammonia will sometimes relieve pains of the limbs, and *remove a venereal eruption?* [§] Does he not confess having given the muriate of barytes, with great advantage, when he could not determine positively whether the case was venereal or not? [||] Does he not mention, that elixir of vitriol will sometimes stop the progress of venereal ulcers, and make venereal eruptions fade and almost disappear, though the benefit is not permanent? Have we not the evidence of Mr. Pearson, in confirmation that the nitric and vitriolic acids have removed both the primary and secondary symptoms of syphilis; and in some instances without the former having recurred, nor the latter appeared at the usual time, when the cure was imperfect? I am not to conceal, however, that Mr. Pearson and several of his friends, affirm, that they have never seen a permanent cure accomplished by these acids, where secondary symptoms had been present. Nor is the efficacy of such remedies in curing primary symptoms, according to Mr. Pearson, sufficiently frequent to make them eligible medicines. *

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* See Hunter's Treatise on the Venereal Disease, and Adams on Morbid Poisons, edit. 2. p. 159, 160.

† See London Medical Review, vol. iii. p. 248, 249.

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[*] See the publications of Dr. Beddoes, Dr. Rollo, Mr. Cruickshank, Dr. Ferriar, Mr. Blair, &c.

[†] Observations on the Effects of various Articles in the Cure of Lues Venerea, edit. 2. p. 12—25.

[‡] Lib. cit. p. 61. [§] P. 91. [||] P. 106.

I next concluded, that if so many remedies are alledged to possess a certain anti-venereal quality, we must at least receive with doubt the doctrine, that all venereal affections constantly become progressively worse, and never undergo the least amendment, nor put on a healing appearance, without the aid of mercury. If an incipient venereal bubo may sometimes be reduced by bark, as Mr. Pearson affirms; or if guaiacum, sarsaparilla, mezereon, walnuts, and opium, have often removed some of the primary and secondary symptoms of lues venerea, as the same gentleman confesses; then I think we are justified in suspecting, that *it is by no means the invariable character of syphilitic complaints to proceed, in every instance, from bad to worse, even though no medicines at all be exhibited.* But, whether this suspicion be correct or not, the inference to be drawn from the observations of the above gentleman, at all events, appears to be, that venereal sores, &c., will often become better, and even heal, without mercury. †

Since the period when the foregoing reflections were made, the great question of the curability of syphilis without the use of mercury has been carefully investigated, more especially in the hospitals of the army. Military surgeons are, of all others, the best qualified for the task, because "their patients are under strict controul, and cannot fly from practitioner to practitioner, and from hospital to hospital. If they are radically cured, the surgeon witnesses their permanent health, and, if a relapse should occur, it cannot escape his observation." ‡

The results of these experiments and enquiries furnish the most unequivocal proof, not only that syphilis may be cured without mercury, but even without the aid of any medicines whatsoever. As far as I can judge, no other inference ought ever to have been drawn from all the evidence which may be brought to bear upon this point, from a review of circumstances connected with the history of the venereal disease; and this, whether we adopt the vulgar opinion, that true syphilis has only been known in Europe subsequently to the year 1493, or the belief, to which I am myself inclined, that it is a disorder which has prevailed from times of the earliest antiquity. In order to avoid, however, as much as possible, the latter controverted point, we shall confine ourselves to times in which the existence of syphilis in Europe has been generally acknowledged.[*] It is well known, that a great many practitioners, both in the sixteenth and seventeenth centuries, combated the venereal disease with considerable success, without the aid of mercury. Fallopius, Palmarius, our countryman David Abercromby[†], and several others, who might be cited, are proofs of the fact; their principal remedies having been guaiacum, sarsaparilla, antimonials, with occasional venesection, and purging.

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* Observations on the Effects of various Articles in the Cure of Lues Venerea, edit. 2. p. 256, 257.

† First Lines of the Pract. of Surgery, edit. 5. p. 211, 212. Lond. 1813.

‡ See Carmichael's Observations on the Symptoms and Specific Distinctions of Venereal Diseases, &c. p. 12. 8vo. Lond. 1818.

Had it been the invariable character of the venereal disease to get worse and worse, until mercury was given, no patients could ever have recovered, before the use of that mineral in the treatment of the distemper had been introduced into Europe[‡]; a supposition, contradicted by abundance of evidence. Nor is it here necessary to avail ourselves of the arguments, which might be deduced from the cessation of the ravages of the particular distemper which broke out in the French army at the siege of Naples in 1494; because I do not see how we are authorized by the descriptions extant to regard that disorder in any other point of view than as a contagious malignant fever, or pestilence, spreading with such celerity as to destroy a large army; an event totally irreconcilable with the well-established facts, that true syphilitic complaints are for the most part chronic, the primary sores only communicable by contact, and the secondary not in any way infectious. Better evidence on the point before us seems to me to be furnished by a review of the practice of the old surgeons, to whom I have already adverted; for, as they cured venereal complaints without mercury, at periods when syphilis unquestionably prevailed, it never can be argued, that *none* of their cases, so treated with success, could have been of that nature; a conjecture, which, though it must naturally arise out of the Hunterian theories, appears to be erroneous in the present state of our knowledge.

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[*] There is so much difficulty in reconciling many of the phenomena and old theories respecting the venereal disease, that I am not at all surprised to find its very existence disputed in a modern anonymous publication; "*Sur la Non-existence de la Maladie Vénérienne,*" Paris, 1811.

[†] The work of this author, which was obligingly pointed out to me by Mr. John Dunn, of Pickering, is remarkable on account of its title: "Tuta ac Efficax Luis Venereæ sæpe absque Mercurio, ac semper absque salivatione mercuriali Curandæ Methodus;" Authore Davide Abercromby, M. D. 12mo. Londini, 1684.

[‡] In China, where the venereal disease is said to have existed 2000 years, mercury has been employed for its cure from time immemorial. See the reports of Toureau, and other Jesuits, as detailed in Astruc's work.

An opinion is sometimes entertained, that the venereal disease is modified by climate, and that it can be cured in warm countries, by means which would completely fail in colder parts of the world. The facility of curing the venereal disease in the West Indies, the Brazils, &c., with sarsaparilla, guaiacum, and other vegetable productions, is a fact, which has long been familiarly known. Without the acknowledgment of such efficacy in these remedies, or in the powers of the constitution, the advocates for the American origin of syphilis, and the believers in the general incurability of the disorder without mercury, would be totally unable to explain how it happened, that the population of the new continent had not been annihilated by syphilitic ravages long before the visit of Columbus. In Portugal, the use of mercury, in the treatment of the venereal disease, is almost entirely abandoned; the disorder proving there very mild, being curable for the most part by mere topical treatment, or wearing itself out without the use of any adequate mercurial remedy. During a superintendance of the Portuguese hospitals for upwards of two years, Mr. Fergusson observed, that the common practice of the surgeons of that country was to cure all cases by simple topical applications; and the return of the patients to hospital with secondary symptoms, after being thus treated, was far from being an universal, or even a frequent occurrence. * It is curious to learn, however, with respect to the British soldiers in Portugal, that the disease in them was often peculiarly severe, a circumstance to be accounted for, either by the difference of their constitutions from those of the natives, or by the treatment which was pursued by our surgeons being less beneficial, than that which was adopted by the Portuguese. This striking diversity in the progress and consequences of the disorder cannot, I think, be rationally imputed to any modification of the virus itself by climate, but rather to a modification of the constitution by that cause, habits of life, &c.; because, if we adopt the first of these opinions, viz. that the thing is to be explained by a change of the virus itself, why should the disease, when contracted from the same sources of infection, have been followed only by mild effects in the Portuguese, and by a severe train of consequences in the British? But, should I be mistaken in supposing, that the constitutions of the natives rendered them less susceptible, than our troops were, of the ill effects of the disease, then I see no other mode of accounting for the difference, than by concluding, that the simple treatment followed in the Portuguese hospitals was attended with more benefit, than the long and injudicious courses of mercury, which, in conformity to the then existing doctrines, were probably adopted in our own establishments, with little discrimination between real syphilis, and other resembling complaints, to which I shall presently request the reader's attention.

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* See an interesting paper, inserted by Mr. Fergusson in the Med.-Chir. Trans. vol. iv., entitled "Observations on the Venereal Disease in Portugal, as affecting the Constitutions of the British Soldiery and Natives."

Nor is it only in the warmer parts of Europe and America, that syphilis is readily subdued without mercury: the same truth is proclaimed in Asia, as may be learned by referring to the observations, published by the experienced Dr. Scott, respecting the anti-venereal virtues of the nitro-muriatic acid *, and of baths impregnated with the same remedy. To me this gentleman's statements appear more important in their relation to the point before us, than as connected with the question of the real efficacy of the particular mode of treatment, which it is the object of his essay to recommend; because, as syphilitic diseases are now known to be capable of a spontaneous cure, it becomes doubtful what share of benefit ought to be ascribed to the acid, especially to its external use in the form of baths.

Putting out of consideration the statements of Abercromby, the inferences which I have drawn from the writings of Mr. Pearson, and an allusion to the meritorious investigations of our army surgeons, the evidence hitherto adduced, only tends to prove, that syphilis can be cured in warm climates without the use of mercury. We shall now find, that the same fact has been unequivocally established in other colder countries. Dr. Armstrong, who has resided in Vienna for many years, and is well acquainted with the practice of the most eminent physicians and surgeons in that city, has informed Mr. Carmichael, that they never give mercury there for primary ulcers. † And another writer, in describing the practice of

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* On the Internal and External Use of the Nitro-Muriatic Acid in the Cure of Diseases. See Med.-Chir. Trans. vol. viii. p. 173, &c.

† Observations on the Symptoms and Specific Distinctions of Venereal Diseases; interspersed with Hints for the more effectual Prosecution of the present Inquiry into the Uses and Abuses of Mercury in their Treatment, by R. Carmichael, 8vo. Lond. 1818.

the surgeons at Paris in venereal cases, tells us, that the fact of every kind of ulcer being curable by common means is well known there, and that M. Cullerier, surgeon to the venereal hospital in that metropolis, annually demonstrates to his class the possibility of doing so; but, after the ulcers have healed, each patient is put through a mercurial course, in order to prevent secondary symptoms.* Several of the German surgeons, who were in our service during the late war, were always extremely reluctant to prescribe mercury for the cure both of syphilis and the resembling complaints, as all army surgeons familiarly know; and yet the success which was obtained in the German regimental hospitals without mercury, was at least equal to what resulted from the opposite treatment in other corps.† In Russia, the doctrine of the absolute necessity for mercury in venereal cases has numerous opponents: consequently, when a vacancy some time ago occurred in the office of surgeon to one of the principal syphilitic hospitals there, it became a question, that was agitated with considerable warmth, whether the appointment should be given to a surgeon of the mercurial or non-mercurial persuasion.

But no facts have had greater weight than those of Mr. Rose‡, surgeon to the Coldstream Guards, in regulating, and, I think, amending the judgment of modern surgeons, on the question of the curability of syphilis without mercury. The importance of this question (says he) is obvious, not so much in reference to the treatment of syphilis under common circumstances; for, the strikingly good effects of mercury will probably not render it adviseable in general to give up the use of that remedy, but from the change which it will produce in our own views of the diagnosis of that disease. The distinction, which has engaged such a share of attention of late years, and which is evidently so important between syphilis and syphiloid diseases, has been made to depend so much upon the former admitting of no cure, except by mercury, that, if this principle should be found to be erroneous, the difficulties which have attended it, will, in a great measure, be explained. Mr. Rose then adverts to the occasional trials which have been made of sarsaparilla, carbonate of ammonia, opium, and different acids, in the treatment of the venereal disease, and to the success of some of these remedies, as attested by men of veracity and ample experience. He notices the fact, of mercury either not being used at all in several parts of Europe, or being used in a manner which we should consider totally inadequate to the cure of the disease. He allows, that many of the cases which happened in Portugal, as mentioned by Mr. Fergusson, would not be regarded by cautious practitioners as truly syphilitic, because, in describing the effects of the disease on the British soldiers, this gentleman states, that, *while the constitution was strongly under the influence of mercury*, the patients became affected with secondary symptoms, in a proportion that could not have been expected. Mr. Rose then speaks of the conclusion, drawn by Mr. Carmichael from Mr. Fergusson's description, viz. that the disease, which prevailed in Portugal, was a phagedenic, or sloughing ulcer, different from the true syphilitic chancre, and for which mercury is neither necessary nor serviceable; an inference at once refuted by the consideration of the impossibility of supposing, that a country like Portugal, then over-run by every description of foreigners, could escape the introduction of syphilis. Mr. Rose next reminds his readers of the practice of some of the foreign military surgeons in our service, some of whom pertinaciously, and even officially, refused to prescribe mercury in syphilis; asserting that it was not necessary in the cure. He had himself tried the same system in the hospital of the Coldstream Regiment of Guards, for a year and three-quarters, and *had certainly succeeded, without mercury, in curing all the ulcers on the parts of generation, which he had met with in that period, with the constitutional symptoms to which they gave rise.* Though some of these cases might not have been truly syphilitic, it is impossible to suppose that others were not so. A considerable number of them presented the commonly received characters of a primary venereal sore, as loss of substance, indisposition to granulate, and an indurated margin and base. They were also seen and considered as well marked cases of true chancre by Mr. Brodie, Mr. Bacot, Mr. Worrell, &c. The battalion of the Coldstream, in which they occurred, consisted of upwards of a thousand men, who, being stationed in this metropolis, and often associating with the lower orders of prostitutes, were particularly exposed to the risk of infection, and might have been expected, in a much shorter period, to furnish many examples of the venereal disease. Mr. Rose also used no mercury in a number of cases of primary sores, which came under his care in the St. James's infirmary; but on these cases he places less reliance, because he had not the opportunity of watching the patients after their discharge, and of course he knows not whether some of them may not afterwards have gone into other hospitals. From Mr. Rose's account, it further appears, that sixty cases of ulcers on the penis had been cured in the York Hospital by simple dressings. The same plan had also been tried pretty extensively by Mr. Whymper, surgeon to the 2d battalion of the Coldstream, in France, without a single instance of failure during a twelvemonth; and the method had been pursued by Mr. Good in the hospital of the 2d battalion of the 3d regiment of Guards at Windsor, with invariable success.

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* Guthrie's Observations on the Treatment of the Venereal Disease without Mercury, in Med.-Chir. Trans. vol. viii. p. 552.

† This seems at first contradictory to the general admission, that mercury, though not absolutely necessary, often expedites the cure of true syphilitic diseases. In order to reconcile these statements, we should recollect, that mercury frequently retards the cure of other complaints, not truly syphilitic, which are more frequent than the former, in a proportion beyond computation.

‡ See Observations on the Treatment of Syphilis, with an Account of several Cases of that Disease, in which a Cure was effected without the use of Mercury: in Med.-Chir. Trans. vol. viii. p. 349, &c.

For the details of Mr. Rose's very interesting cases, I must refer to his own paper. In the treatment, all ideas of specific remedies were entirely laid aside. The patients were usually confined to their beds, and such local applications employed, as the appearances of the sores seemed to indicate. Aperient medicines, antimony, bark, sulphuric acid, and occasionally sarsaparilla were administered, if from any circumstances they were judged necessary. The observations of Mr. Guthrie[*], Professor Thomson[†], of Edinburgh, Mr. Hennen[‡], and indeed the united reports of all our army surgeons, from different parts of these kingdoms, and France, confirm in the fullest degree the above statements, respecting the curability of the primary and secondary effects of syphilis without mercury, and, generally speaking, of all sores, whether truly syphilitic, or only of a resembling nature, "provided sufficient time be granted, the constitution be good, the patient regular in his mode of living, and attention be paid to cleanliness and simple dressings, and to keep the patient in a state of quietude."[§]

From the preceding facts and view of the subject, many curious and important considerations naturally arise. In the first place, they oblige us to renounce all the most important doctrines advanced by Mr. Hunter, and adopted in almost every school, in relation to the history, progress, and cure of the venereal disease. They compel us to believe, either that true syphilis has totally changed, in the course of the last twenty, or thirty years, or that most of the Hunterian theories about it were always false and founded upon mistaken notions. At the present day, it will be extremely difficult to come to a positive decision, with regard either to the altered nature, or diminished frequency of syphilis; more especially, when we recollect two facts; first, that ever since the epoch of the supposed introduction of this disease from America, there have been practitioners at all times, who successfully treated every form of venereal complaints without mercury; and secondly, the absolute impossibility of our asserting, that if experiments had been formerly made, similar to those which have now been undertaken on a public-spirited, impartial, and extensive scale, the same results and inferences would not have followed. The facts, recently established, lead also to other highly important and interesting questions, in respect to the frequency and nature of the secondary symptoms, which occur when no mercury has been employed.

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[*] In Med.-Chir. Trans. vol. viii.

[†] Edinb. Med. and Surg. Journ. No. 53. p. 84, &c.

[‡] Op. cit. No. 54. p. 201, &c.

[§] Guthrie, Med.-Chir. Trans. vol. viii. p. 556.

Upon an average, according to Mr. Rose, one out of every three of the sores, thus treated, was followed by some form or other of constitutional affection, which was in most instances mild, and sometimes so slight, that it would have escaped notice, if it had not been carefully sought for. The constitutional symptoms were evidently not such as could be regarded as venereal, if we give credit to the commonly received ideas on the subject. Caries of the bones, and some of the least equivocal symptoms, did not occur. In no instance was there that uniform progress, with unrelenting fury, from one order of symptoms and parts affected to another, which is considered as an essential characteristic of true syphilis. *

Considerable diversity, however, prevails in the statements, concerning the frequency of secondary symptoms in the instances in which no mercury was used. While Mr. Rose, as we have seen, represents the proportion, observed by himself, to be as great as one out of every three cases, only six cases of secondary symptoms were remarked in the York Hospital, in nearly 100 patients, who had been treated without mercury. It is allowed, however, that the real proportion might have been somewhat larger; and, according to some other returns collected by Mr. Guthrie, the proportion would appear to be

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* Rose in Med.-Chir. Trans. vol. viii. p. 422

about one-tenth.[*] As far as the observations of another writer have extended, eruptions are much more common in patients treated without mercury, than in others treated with it; but he states, that in none of the former instances have the breakings out ended in ulcerations, as has frequently happened in the latter.[†] The observations, drawn from the returns of certain military hospitals, and published by Mr. Guthrie, also tend to prove, that mercury lessens the frequency of secondary symptoms; for it appears, that out of 521 cases, treated with mercury in one district, only ten cases of secondary symptoms happened.[‡]

In regard to the general mildness and curability, without mercury, of such secondary symptoms, as take place in cases where that mineral has not been employed, the reports of nearly all the gentlemen, who have entered into this investigation, completely agree. They concur also as to the fact of the rarity of the bones being affected.

The further the subject before us is investigated, the more reason we find to join Hunter, Carmichael [§], and Weizmann [||], in the belief, that "*other diseases* may not only resemble the venereal in appearance, but in the mode of contamination; proving themselves to be poisons, by affecting the parts of contact; and from thence producing, not only immediate consequences similar to buboes, but remote consequences, similar to the lues venerea." Mr. Carmichael and many other surgeons express a suspicion, that syphilis is now comparatively seldom witnessed in this country; although they conceive there is reason to believe, that it was the most predominant form of the venereal disease in the time of Mr. Hunter. Mr. Carmichael also remarks, that, "a few years back, and particularly in 1812 and 1813, that malignant attendant of the phagedenic disease, the sloughing ulcer, was extremely prevalent in Dublin; but, I have not seen it in a single case, either in private or public practice during the last two years. It may, therefore, be considered as far from improbable, that there are prevailing forms of venereal affections, like prevailing epidemics, at different times and in different countries; a circumstance that (he conceives) may possibly depend on the importation of fresh infections, although these arrivals are seldom recorded with the same notoriety as that of syphilis from St. Domingo." *

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[*] Med.-Chir. Trans. vol. viii. p. 559—561.

[†] Hennen in Med. and Surg. Journ. No 54. p. 202.

[‡] Op. et. vol. citat. p. 569.

[§] See his inquiry into the probability of the spontaneous origin of some diseases, which bear a resemblance to the constitutional symptoms of syphilis, in his "Essay on the Venereal Diseases, which have been confounded with Syphilis." 4to. Lond. 1814.

[||] Russiche Sammlung für Naturwissenschaft und Heilkunde, t. i.

If any gentleman is entitled to superior praise for industry and talent in endeavouring to discover the distinctions, which are to be made between syphilis and the diseases which have generally been confounded with it, this high compliment, I think, is unquestionably due to Mr. Carmichael. This gentleman confines the term syphilis to that disease, in which the chancre, or primary ulcer on the genitals, has a *hardened edge and base;* in which the blotches are *scaly*, as described by Willan, with the *excavated ulcer of the tonsils*, noticed by Hunter; or, when affections of the bones are complained of, those patients alone are truly syphilitic, who have *nocturnal pains in the shafts of the long bones*, or *decided nodes*, or *enlargement of the bone.* All other cases, although approaching in many of their characters to syphilis, are not to be considered as syphilitic; but, as they may proceed from sexual intercourse, Mr. Carmichael adopts the term venereal for them, in contradistinction to syphilis. † In proceeding through a consideration of the primary and secondary symptoms of the disease, I shall notice some of the principal opinions advanced by Mr. Carmichael, to which the greatest attention is certainly due, as being the only rational attempt ever made, as far as I can judge, to point out criteria, by which the real forms of syphilis are to be discriminated from the multiplicity of diseases more or less resembling it. As we shall presently see, one of the most important propositions, which the observations of that gentleman tend to establish, is, "the constant association of a distinct and peculiar train of constitutional ailments, with corresponding primary symptoms, demonstrating that the regularity, which marks the character of all morbid poisons, also has a place in venereal diseases."

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* Observations on the Symptoms and specific Distinctions of Venereal Diseases, p. 220. Mr. Carmichael, however, is not exactly correct in mentioning the importation of syphilis from St. Domingo, as having been recorded with notoriety: this suspicious doctrine was first started by Fallopius seventy years after the alleged event.

† See an Essay on the Venereal Diseases, which have been confounded with Syphilis, and the Symptoms, which exclusively arise from that Poison. 4to. Lond. 1814.

OF TRUE CHANCRES, AND OTHER PRIMARY SORES.

Chancres signify sores which result from the application of true syphilitic matter to a part of the body; and, consequently, they are generally situated on the genitals. A chancre usually has a thickened base, and, although the common surrounding inflammation sometimes spreads much further, the specific is confined to the subjacent and immediately contiguous induration. The inflammation which precedes a chancre begins with an itching, and, if the glans penis be the part affected, a small pimple is formed, full of matter, without much hardness or swelling. When the disease occurs on the prepuce, or frænum, the effects of the inflammation are more extensive and visible. The itching is gradually changed into pain; the surface of the prepuce is in some cases excoriated, and afterwards ulcerates; in others, a small pimple precedes the formation of the ulcer. Then a thickening of the part takes place, and, while this effect remains altogether specific, it is very circumscribed, and its edge has an abrupt termination. The base of a chancre is hard, and its margin somewhat prominent. When such a sore is situated on the glans penis, it sometimes causes profuse bleeding. In women, chancres are usually situated on the labia, or nymphæ, and, but very rarely, in the vagina. The discharge from a chancre contains the true syphilitic poison, and, of course, is capable of imparting the disease by contact or inoculation. *

Mr. Carmichael also adopts Mr. Hunter's excellent definition of chancre, and points out, that it is the solidity, firmness, and abrupt termination of the surrounding induration, which chiefly distinguish it from other ulcers. This induration, however, is less marked, when a chancre is situated on the body of the penis, but then it is of a dark livid colour, which, if mercury be not resorted to, " is alternated every third or fourth day, with that of a light brown, or tawny, sufficiently distinguishing it from the dark sloughing ulcer, with which it might be confounded." The chancrous ulcer, at the same time, extends its dimensions slowly, and, " as it advances, the surrounding induration obviously increases." Phymosis and inflammation are also " less frequently attendants upon chancre." The secondary symptoms, represented by Mr. Carmichael, as following the absorption of the virus

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* See Hunter's Treatise on the Venereal Disease.

of a true syphilitic chancre, or bubo, are, first, an eruption of scaly blotches, presenting either the character of lepra, or psoriasis, unattended with any obvious degree of fever; secondly, excavated ulcers of the tonsils; thirdly, pains in the joints, tibiæ, cranium, &c.; fourthly, nodes. He proposes also for venereal diseases, a new nomenclature, founded on the characters of the eruptions, which he thinks afford the most certain criterion, and, of course, he suggests the propriety of naming the true chancre and its consequences, the *scaly venereal disease.* *

Mr. Carmichael divides the primary diseases which have been confounded with syphilis, into two classes; the first comprehends, 1. A superficial ulcer, without induration, but with elevated edges. 2. A similar ulcer, destitute not only of induration, but of elevated edges. 3. An excoriation of the glans penis, and internal surface of the prepuce. 4. Gonorrhœa virulenta. From the first of these four diseases, he has been seldom able to trace any constitutional symptoms. The constitutional symptoms of the other three species are precisely alike, and cannot in the slightest degree be distinguished from each other.

In the second class, Mr. Carmichael comprises the two remaining species of pseudo-syphilitic disorders, viz. the phagedenic ulcer, and the sloughing ulcer. "There is (says this gentleman) a strong resemblance between these two primary diseases, as the sloughing ulcers, when the sloughs separate, can scarcely be distinguished from the phagedenic. Whether their constitutional symptoms are alike, is more than I am willing to decide, not having witnessed more than one case of the constitutional symptoms of the sloughing ulcer; but I should not omit to mention, that the appearances were favourable to the presumption of their similarity. But I have had an opportunity of observing numerous instances of the constitutional symptoms of the phagedenic ulcer, and they are materially distinct from those which arise from the primary affections comprised in the first † class." At the time when Mr. Carmichael published the essay quoted below, he calculated, that the number of patients with these ulcers, who sought admission into the hospital under his charge, exceeded those with true syphilitic chancre in the proportion of five to one. What the proportion may be at the present time I know not; but it must be wonderfully changed, if the very curious assertion he made in this author's latest work be correct, viz. that, in the considerable space of time which has elapsed since he published his essay, *he has met with only three cases of true syphilitic chancre in all his extensive practice, public and private.* * How we are to reconcile this account with Mr. Hennen's statement, that, on an average, twenty out of every 105 are Hunterian chancres, is difficult to say, unless we suppose the latter gentleman is more easy in admitting cases as chancres than Mr. Carmichael, who now rejects all ulcers from this class which do not possess "the callous edge and base, terminating abruptly under the skin, and feeling nearly as hard as a piece of cartilage."

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* See Observations on the Symptoms and specific Distinctions of Venereal Diseases, p. 202, &c. 8vo. Dublin, 1818.

† See Essay on the Venereal Diseases, which have been confounded with Syphilis, &c. p. 61.

Let us now consider more particularly the primary diseases, which Mr. Carmichael has described as being liable to be confounded with syphilis, excluding from present attention, however, the subject of gonorrhea. The first class of these diseases are:

1. *The superficial ulcer, without induration, but with elevated edges,* sometimes displays a whitish, and, in other instances, a reddish brown surface, without any appearance of granulations. It is not excavated, but is either on a level with the surrounding skin, or considerably raised above it, though sometimes the elevated edges give an appearance of excavation. At its commencement, it appears in the form of a small pustule, attended with itchiness of the part. It sometimes bears a strong resemblance to the phagedenic ulcer, from which, however, it may be distinguished by its raised and well defined margin. It occurs on the external surface of the prepuce, body of the penis, and scrotum; and sometimes a circle of small ulcers of this kind forms upon the orifice of the prepuce, producing an obstinate phymosis, which remains after the sores are healed, and requires the use of the knife. Mr. Carmichael has seen very few instances in which he has traced this sore to its constitutional symptoms, but in the appendix to his essay details two cases, in both of which the eruption was *pustular,* and afterwards spread into ulcers,

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* Obs. on the Symptoms and Specific Distinctions of Venereal Diseases, p. 14.

† See Essay on the Venereal Diseases, which have been confounded with Syphilis, &c. p. 65. Obs. on the Symptoms and Specific Distinctions of Venereal Diseases, p. 44—45.

covered at first with *thin* crusts. In short, the ulcer with elevated edges, without induration, according to Mr. Carmichael, is liable to be followed by buboes with undermined edges; an eruption of pustules, generally phlyzaceous, preceded by fever, and terminating in ulcers covered with thin crusts, healing from their margins, and, when the disease is on the wane, the eruption desquamates into scaly red blotches. On the fauces, ulcers occur in different places, with a white aphthous appearance; and sometimes pains in the joints and nodes. To this ulcer, and its consequences, Mr. Carmichael applies the name of *Pustular Venereal Disease*, from the character of the eruption.*

2. *The ulcer, which is destitute not only of induration, but of elevated edges*, is generally raised above the surrounding skin, and exhibits a smooth surface, the colour of a healthy sore, but without granulations, and has somewhat of a fungous appearance. Sometimes it is on a level with the surrounding skin, and is seldom excavated. The seat of this ulcer is more frequently the glans and internal surface of the prepuce; and, in women, the labia, perineum, and fossa of the nates.

3. *Excoriation of the glans penis, and internal surface of the prepuce, attended with purulent discharge*, is usually accompanied with gonorrhea, and produces phymosis. The corona glandis is the part most affected; but, when the prepuce can be retracted, the excoriation is found to be in patches only, with intervening spots of sound cuticle.

Mr. Carmichael's observations lead him to believe, that the constitutional symptoms, which are apt to follow the ulcer without induration, or elevated edges, and excoriation of the glans and prepuce, and the gonorrhœa virulenta, are the same, and therefore, that all these diseases have their source in the same venereal poison. The constitutional symptoms consist of more or less fever, which ushers in a *papular* eruption, and soreness of the fauces, attended with difficulty of swallowing, severe pains in the head and larger joints, irritis, and sometimes inflammatory swellings over the superficial bones, which many would call nodes.[*] The whole of these cases, taken collectively, Mr. Carmichael proposes to distinguish by the appellation of the *Papular Venereal Disease.*[†]

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* Essay, &c. p. 62., and Carmichael in Lond. Med. Journ. for 1815, where this author has related a considerable number of examples of this species of ulcer, three of which were attended with constitutional symptoms. The eruption in each consisted of phlyzacious pustules, some of which declined, while others ulcerated, and were covered with thin scaly crusts.

The second class of primary diseases, which have been confounded with syphilis, consists of two species; viz. the *phagedenic ulcer*, and the *sloughing ulcer*.

1. *The phagedenic ulcer* is described by Mr. Carmichael, as a corroding sore, without granulations, or surrounding induration, spreading with great rapidity, and having its destructive process increased instead of being checked, like chancre, by mercury. It more frequently attacks the glans, which it sometimes totally destroys, and occasionally, notwithstanding "every anodyne and lenient application, the ulceration will gradually proceed, until the entire penis is destroyed." The ulceration, by destroying the coats of an artery, may produce such profuse hemorrhages as can only be stopped by ligatures, but, in this case, its progress is arrested. One of its remarkable characteristics is the frequent return of ulceration, after the part has healed, to the very same spot which was first affected. The constitutional symptoms are, an eruption of tubercles, or spots of a *pustular* tendency, or both intermixed, preceded by fever, and terminating in ulcers covered with thick crusts, which often assume a conical form, healing from their centre, and extending with a phagedenic margin.[†] The affection of the throat is "a white slimy-looking ulceration," which occupies almost the whole of the back of the pharynx in view; and may be followed by caries, exfoliation of the spongy bones, tenderness of the ossa nasi, and a foul discharge from the nostrils. The velum and uvula are occasionally destroyed, so that on looking into the mouth of a person in this lamentable state, there appears one vast continuous ulcerated cavity, covered with white viscid matter, and extending from the palate to the lower part of the pharynx. At the same time that the patient is thus affected, the larger joints, and sometimes the smaller, also become red, swelled, and exquisitely painful, and nodes suddenly appear, which cannot be distinguished by their aspect from those of syphilis. According to Mr. Carmichael, the ulcer with elevated edges not unfrequently exhibits the apparently corroded surface, which characterises the phagedenic ulcer,

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[*] Essay, &c. p. 82. See his Obs. on the Symptoms and Specific Distinctions of Ven. Diseases, p. 205.

[†] Carmichael's Obs. on the Symptoms and Specific Distinctions of Ven. Diseases, p. 209.

and its secondary symptoms also have a very close resemblance to those of the latter sore. *

2. *The sloughing ulcer* at first resembles a small black spot, which produces so little uneasiness, that it remains unnoticed for several days; it soon however increases, and, when the slough separates, the sore is not clean and granulating, as in simple mortification, but a corroding phagedenic ulcer appears, which becomes painful, assumes a bluish cast, and is soon covered again with a fresh slough. In this manner, alternately sloughing and ulcerating, it proceeds, until the whole of the external organs of generation, and sometimes the bladder also are involved, and, even if the progress of the disease be checked, the orifice of the urethra is so contracted and obstructed, that great difficulty in voiding the urine is experienced; a circumstance which was observed by Celsus. The sloughing ulcer is said to produce the same kind of secondary symptoms as are connected with the phagedenic sore, and the whole of these affections Mr. Carmichael distinguishes by the name of the *Phagedenic Venereal Disease.*

Such is the arrangement proposed by Mr. Carmichael, in which, however, many surgeons do not coincide, I mean with respect to the regularity and peculiarities of the secondary symptoms, and of the eruption in particular, represented by that gentleman as appertaining to each primary † disease. Indeed, he carries this doctrine so far as to say, that every primary affection has its corresponding eruption, so that we may foretell by the former what the latter will be; or, if we have only the opportunity of seeing the eruption, we may judge what the primary ulcer has been. ‡

With respect to the *treatment of the true syphilitic chancre*, the fact of even this kind of sore being generally capable of cure without mercury, though often in a less expeditious manner, must, I think, be admitted on the unequivocal and abundant evidence now brought before us. The determination of this question, however, is far from amounting to any thing like a decision, that mercury ought not to be employed in the cure. On the contrary, all those gentlemen who have so ably investigated the point, candidly own, that mercury generally expedites the recovery. Thus, Mr. Guthrie tells us, that ulcers, possessing the true characters of chancre, required in general a longer period than other sores for their cure, "that is, from six, eight, to ten, twenty, and even in one case twenty-six weeks, healing up and ulcerating again on a hardened base;" and he afterwards expresses his conviction from former experience, that almost all these proctracted cases would have been cured in one-half or even one-third of the time, if a moderate course of mercury had been resorted to, after common applications had been found to fail.* If some other statements laid before the public by another gentleman were correct, however, the effect of mercury in accelerating the cure of chancres would be less striking; because it is said, "the general period (required for the healing) was four weeks, and this whether the sores possessed the Hunterian characteristics or not."† It is admitted, however, by the same author, that the cure of some other protracted cases would probably have been hastened by the use of mercury. The fact of the possibility of curing true chancres without mercury is then by no means to be confounded with the question of the propriety of the practice; since, as far as I can collect from frequent conversations with army surgeons, not one of these gentlemen contends, that mercury should be abandoned in the treatment of primary syphilitic sores. The fact, however, is of vast importance, both because it explodes the error of inferring, that a sore cannot be venereal because it is healed without mercury, and the equally false and still more dangerous notion, that large quantities of this mineral are necessary for the cure of a chancre. It teaches us, that, in unfavourable states of the health, we may await its improvement with safety, before we have recourse to the medicine. In short, it instructs us, that mercury, though useful, is not so absolutely necessary in the treatment, as to claim the name of a specific for primary syphilitic ulcers. Hence we ought to prescribe it in moderation, and rather in alterative doses, than in such quantities as are calculated to excite profuse salivation.

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* Op. cit. p. 59.

† "As we have seen true syphilis accompanied by eruptions not scaly, so we have seen the primary symptoms of pseudo-syphilis described in the first class of our author's arrangement, followed both by pustular and tubercular eruptions; and that the same infection will also produce eruptions of a different character in different individuals, has been ascertained," &c. See Lond. Med. Repository, vol. iv. p. 323.

‡ The anomalous cases, which Mr. Carmichael excludes from this classification, will be noticed in the sequel of this chapter.

Whether the united experience of surgeons in general ultimately confirm, or not, Mr. Carmichael's belief in the existence of different venereal poisons, and in the uniformity of the secondary symptoms arising from each of them, still, I think, one truth will remain unshaken; viz. that true syphilitic chancres are often influenced in their progress by constitutional causes. In irritable weak habits, even after the original character and appearance of the sores have been changed by mercury, we often find, that the ulceration will continue to spread, or sloughs to be formed. Too often, under such circumstances, the foul appearance of the ulcerated surface leads the unwary practitioner to increase the quantity of mercury; the system then becomes more and more disordered and debilitated; and the local disease grows worse with the declension of the health, until either the patient dies, or is absolutely too weak to employ the destructive medicine any longer. *

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* Med.-Chir. Trans. vol. viii. p. 558, 559.

† Hennen, in Edinb. Med. and Surg. Journ. No. 54. p. 207.

To the foregoing statement, Mr. Carmichael himself also assents; admitting, that neglect, local irritation, and excessive constitutional irritability, will cause a venereal ulcer, as they will any other, to become phagedenic, however originally mild in its nature. It must, therefore, as he correctly observes, be in the highest degree useful to attend to the progress of an ulcer, and if possible ascertain, *whether it was of the phagedenic species from its commencement*, or not; and, if not, it is to be classed with that venereal disease, which may be termed phagedenic. †

Whenever chancres, which originally presented the true syphilitic character, afterwards alter, and rapidly extend themselves by a phagedenic, or sloughing process, there is always great reason to believe, that the alteration is owing to an unfavourable state of the constitution, irritation of the diseased part, or general bad treatment. In such cases, mercury should be omitted, without delay, or hesitation; bark, sarsaparilla, guiacum, and the nitrous or sulphuric acid prescribed, with absolute rest, plenty of good fresh air, &c. As far as my observations extend, one of the best dressings in these cases is a solution of the extract opium, in the proportion of ʒiss to ℔j of water, which may be applied by means of lint, laid under a simple pledget. Thus the state of the constitution will be amended; and, as this happens, the morbid appearances of the sore, which depended on general weakness and irritability, will disappear; and then, if necessary, (which I believe will rarely be the case,) mercury may be given in moderate quantity again.

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* On this subject, some good observations may be perused in a work entitled "An Enquiry into the History and Nature of the Disease produced in the Human Constitution by the Use of Mercury, with Observations on its Connection with Lues Venerea," by A. Mathias, Lond. 1816.

† Carmichael in Obs. on the Symptoms, &c. of Ven. Diseases, &c. p. 61. The existence of a primary phagedenic ulcer, originating from a specific poison, independent of constitutional causes, is not universally admitted.

As every surgeon knows, a true syphilitic chancre, while small, may be cured by removal with the knife, or destruction with caustic; and, if none of the virus has been absorbed, the patient will remain free from secondary symptoms. As, however, there is always an uncertainty, whether absorption has taken place or not, the plan has never been very commonly adopted, because if mercury is to be given at all events, with a view of preventing secondary symptoms, little good is gained by the former mode of proceeding, as the sore will heal very well without it. Astringent lotions, containing the sulphate of copper, or that of zinc, and any common simple ointment, are the best general applications for chancres. The dressings, however, must vary, according to the state of the sore; and, in the healing stage, when the granulations are high, the use of the nitrate of silver, or of the unguentum resinæ with ʒj of the pulv. hydrargyri nitrico-oxydi, will materially expedite the process of cicatrization.

With regard to the treatment of such primary complaints, as are liable to be confounded with chancre, my limits oblige me to be very brief.

The superficial ulcer, without induration, but with elevated edges, may be cured by dressing it with washes, either of muriate of mercury and lime-water, in the proportion of a grain to an ounce; or of the submuriate and lime-water, in the proportion of ten grains to an ounce; or of the compound spirits of lavender alone, or diluted with one or two parts of water. Together with these applications, Mr. Carmichael orders decoctions of sarsaparilla, and small doses of antimony, either separately, or in conjunction. "Primary ulcers, with elevated edges, (says he,) are often extremely obstinate under the use of mercury. I have frequently seen that medicine exhibited in full doses, which maintained a strong mercurial action in the system for several months, without inducing them to heal." He assures us, also, that stimulating and caustic applications do no good, and if the ulcer be irritable make it extend. "In fact, our principal care should be to keep the patient at perfect rest; and this observance, with gentle astringent applications, or mild ointments, seems to be all that is requisite," the above medicines being prescribed rather to satisfy the patient, than as essential. *

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* See Obs. on the Symptoms and specific Distinctions of Ven. Diseases, p. 47.

The *simple primary ulcer, without either induration or elevated edges,* requires the same treatment as the former case, except when it appears on the external surface of the prepuce, body of the penis, or on the scrotum, resembling a fungus, or soft wart; in which case, the wash should consist of two or three grains of the oxymuriate of mercury to an ounce of water.

The third example "*excoriation of glans penis, and internal surface of the prepuce, attended with purulent discharge,*" may also be cured by simple means, resembling those recommended for the two preceding cases. As, however, it is often joined with gonorrhœa and phymosis, the chapters on those subjects must be consulted for other particulars of the requisite treatment.

Mercury, which is beneficial to chancres, is found to be injurious to the *primary phagedenic ulcer.* Mr. Carmichael affirms, that he has never yet met with an instance, where mercury was employed, without rendering this kind of sore worse and more untractable. He therefore lays it down as a positive rule, that it should not be treated with mercury; but, though such is his opinion, while he also doubts the efficacy of mercury in preventing secondary symptoms, he will not deny absolutely the propriety of prescribing this medicine with such a view, *provided the ulcer be previously healed.* He thinks it, however, more rational and philosophical to wait, until the presence of the poison is evinced by its peculiar symptoms, than rashly to subject a patient apparently convalescent, to the noxious influence of mercury, when we know not whether he may not be altogether free from disease. *

The experience of the preceding author is then adverse to the plan of giving mercury in cases of primary phagedenic ulcer, which he represents as having been invariably injured by that mineral in every trial which was made of it. With respect both to this and the *sloughing sore,* "the treatment which succeeded best, was the use of means calculated to lessen inflammation and pain, including general blood-letting, antimonials, purgatives, cicuta, and opium. The local applications were warm fomentations, and bread poultices, frequently with the addition of opium. In every instance, low diet, and the recumbent position, were strictly enjoined." Mr. Carmichael also found nothing more effectual in stopping the progress of these destructive ulcers, than "the division of any band of integument, which connected two portions of the ulcer together," such division being merely an anticipation of the destruction of this bridle by ulceration. He also commends the removal of any jagged part of the edges of the ulcer, or of the adjoining surface, which may have a livid colour, and be ready to fall into ulceration; measures, which he thinks owe their utility chiefly to the bleeding excited by the use of the knife. *

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* Obs. on the Symptoms, &c. of Ven. Diseases, p. 61.

OF SYPHILITIC AND OTHER BUBOES.

While no venereal matter has been taken up from the surface of a chancre by the absorbent vessels, the disease is entirely a local one. The matter in being absorbed is very apt, in its passage through the inguinal glands, to occasion an inflammation and enlargement of them, followed by suppuration and ulceration. This secondary affection is named a venereal bubo. The syphilitic poison (it is also not unfrequently supposed) may sometimes lodge on the sound skin, be absorbed without the occurrence of any ulceration at all, and a bubo be the consequence. However true syphilitic buboes are commonly preceded by a chancre; and they more frequently follow sores on the prepuce, than those on the glans.

The absorbent glands in the groin are subject to enlargements altogether unconnected with venereal causes, and the practitioner should discriminate syphilitic affections of this kind from other swellings in the groin arising from different causes. Mr. Hunter was of opinion, that commonly only one gland is affected at the same time, in consequence of the absorption of syphilitic matter; and, if this be the case, we have one criterion, by which we may know how to distinguish a true venereal bubo from other swellings. The syphilitic poison also affects the glands nearest the seat of absorption, and never those, which are situated in the course of the iliac vessels, and higher up.

This kind of bubo commonly begins with a sense of pain, and a small hard tumour is soon perceived. This increases like every other inflammation, that has a tendency to suppurate, and, if not checked, advances to suppuration and ulceration, the progress of the matter to the skin being quick.

Some few syphilitic buboes, however, are slow in their progress, and Mr. Hunter suspects, that the inflammatory process, is then retarded by mercury, or a scrofulous tendency.

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* Op. cit. p. 64, 65.

Generally speaking, the true venereal bubo is usually confined to one gland, and does not become diffused before suppuration has taken place. It is rapid in its progress from inflammation to suppuration, and ulceration. The quantity of matter that forms is copious, and the pain very acute. The colour of the skin, affected with inflammation, is often a florid red.

According to Mr. Carmichael, the distinguishing characteristics of a syphilitic bubo, are more difficult to assign, than those of chancre; but, he conceives, that the aching pains, which attend it, a callous feel of its bottom, and the dark, foul, tawny appearance, may assist in forming a diagnosis. Although I cannot concur in the statement here made, I must agree with this valuable writer, respecting the propriety of his rule of not ordering mercury for buboes, which have not been preceded by chancres; a plan, he observes, in which "the subsequent appearance of syphilitic constitutional symptoms has never in any instance occurred."

Buboes not of a syphilitic nature are generally preceded, and attended with a slight fever, or, as Mr. Hunter says, the common symptoms of a cold, and the swellings are usually indolent and slow in their progress; but when quicker than common, they are more diffused than syphilitic buboes, and often affect at once several glands. In general, they do not suppurate, but continue stationary; and, when they do suppurate, it is slowly, and often in more glands than one. The matter comes slowly to the skin, unattended with much pain, and the colour of the integuments is a dark purple. If the swelling be only in one gland, be very slow in its progress, and give but little or no pain, it is probably scrofulous.

The matter of a syphilitic bubo contains the specific virus, and is therefore capable of communicating the disease.

TREATMENT OF BUBOES.

The same observations, which have been delivered respecting the falsity of the doctrine, that true syphilitic chancres do not admit of cure without mercury, are equally applicable to the buboes, which originate from such primary sores. Thus, in a great many of the cases, which were treated in the hospitals of the Guards without mercury, the absorbent glands of the groin were affected, and often suppurated. "The abscesses were in general allowed to burst of themselves, and almost all of them healed readily." Two cases, however, are mentioned, which proved more troublesome; one was that of a sloughing or phagedenic bubo; the other an instance in which the difficulty arose from the number of absorbent glands, which became affected.* In numerous other cases of primary sores, treated without mercury, as referred to by another late writer, we are informed, not only, that buboes occurred on the average with less frequency, than in other instances, where mercury had been used, but also, that these swellings were not so often followed by suppuration; a circumstance ascribed to the antiphlogistic means which were employed. Mr. Hunter, who had the same implicit faith in the necessity of mercury in the cure of syphilitic buboes, which influenced all his opinions relative to the true venereal disease, conceived, that, in attempting to effect the dispersion of a syphilitic bubo, it was an object of high importance always to make as much mercury as possible pass through the swelling, by rubbing the unguent. hydrarg. on surfaces, from which the absorbents tended to the seat of the local disease. The same plan he deemed equally commendable when a bubo of this nature was in a suppurated state; for, both in this and the preceding stage of the swelling, the medicine, says he, thus applied, cannot pass into the common circulation without going through the diseased parts, whose cure it must promote in its passage through them, while it also prevents the matter, which has already passed, and is still continuing to pass, into the constitution, from acting there, so that the bubo is cured, and the constitution preserved.

According to the Hunterian precepts, then, the thigh, leg, or part of the abdomen on the same side as the bubo, are the places on which the frictions should be made. Mercury, however, can only cure the specific quality of the inflammation. When the common inflammation rises very high, bleeding, purging, and fomentations are requisite auxiliary means; and if the bubo be conjoined with erysipelatous inflammation, Mr. Hunter recommended bark; if with scrofulous, hemlock, and poultices made with sea-water. True syphilitic buboes ought seldom to be opened. When it is thought proper to open them, the skin should be allowed to become as thin as possible; for the abscess will heal better in consequence of this rule being observed. How long the mercurial frictions are to be continued, and in what quantity the ointment is to be rubbed in, are questions to which different replies would be made by the believers in the Hunterian tenets, and by what may be called the mercurial reformers, who, while they generally inculcate the possibility of curing all forms of syphilis without mercury, acknowledge the superior efficacy of this mineral in accelerating the cure, and rendering secondary symptoms less frequent, which advantages they think may also be best obtained by prescribing mercury in small alterative quantities, than in large doses, and for a great length of time, with a view of exciting salivation. While surgeons were swayed by the belief, that no syphilitic disease could be cured without mercury, the common plan, when a bubo healed very slowly, was to discontinue this mineral after the constitution had been kept a reasonable time (perhaps five or six weeks) strongly under its influence. But when the bubo had rapidly healed, mercury was given for a fortnight or three weeks after the disease in the groin was quite well. It was universally known, and admitted, however, that there were many instances, in which it was quite unnecessary to continue mercury until a bubo was entirely healed.

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* Rose, in Med.-Chir. Trans. vol. viij. p. 379. Guthrie, op. et vol. cit. p. 556.

Sometimes the sores produced by buboes assume an ill-conditioned appearance, even when they are losing, or are quite deprived of their original syphilitic character. We are not, therefore, always to set down the backwardness of a bubo to heal, as a mark of the presence, or continuance of its first nature. The disorder, produced in the system by a course of mercury is frequently a cause why syphilitic buboes are gradually converted into phagedenic ulcers, or such as will not cicatrize. In scrofulous constitutions, the irritation of venereal matter, in its passage through an absorbent gland frequently gives rise to a scrofulous enlargement of the groin, and this disease will not be made to heal by the influence of mercury; on the contrary, if the system should have already suffered much from a mercurial course, perseverance in this treatment will change the usual indolence of a scrofulous abscess, or ulcer, into a foul, fast-spreading, ill-conditioned, local disease. In these cases, bark, sea-bathing, pure air, and the internal and external use of hemlock, are highly serviceable.

With regard to such buboes as belong to what Mr. Carmichael terms the *papular venereal disease*, and arise from primary ulcers, which he distinguishes by the negative characters of having neither callosity, raised edges, nor phagedenic surface, his experience has not taught him, that mercurial frictions will discuss these swellings. On the contrary, the trials, which he has made of this medicine, incline him to believe, that it tends to increase the inflammation and chance of suppuration; and, that when in a state of suppuration, they will heal better if the patient be not subjected to a strong mercurial irritation. He observes, that buboes of this nature are often remarkably hard and indolent, without any tendency to subside, or suppurate. In such cases, he says, the greatest advantage may be derived from the repeated application of blisters to the indurated bubo, which soon either bring about the dispersion, or the suppuration of the tumour. *

The buboes, which arise from the primary ulcer with elevated edges, are alleged to resemble the original sore in their tendency to form projecting, or undermined edges, particularly, when much mercury is employed; and, says Mr. Carmichael, if these edges are not removed by art, the disease may remain for months, and perhaps years, without healing. He prefers the knife for their removal, as caustic is too slow in its effect; and by this plan he has got many cases well in five or six weeks, which would have resisted any other mode of practice as many months. Full courses of mercury always increase their tendency to *burrow*, and not unfrequently produce dreadful mischief; the integuments, even up to the navel being undermined or destroyed. To the accuracy of this statement, my own observations, while an apprentice at St. Bartholomew's Hospital, enable me also to bear testimony. † Mr. Carmichael likewise mentions having met with eight, or ten cases of ulcers, situated either on the groins, and pubes, or scrotum and fossa of the nates, or on all these parts at once in the same individual, and resembling in their raised edges and obstinate nature the primary ulcer of this description. He describes them as creeping on slowly, with margins both raised and undermined; and expresses doubts, whether they should be considered as primary, or secondary ulcers, though he inclines to the former opinion, as they were never accompanied with any other symptoms indicating a general affection of the system. In all the cases, the patients had used large quantities of mercury, and one might therefore regard such ulcers as mercurial, if they were ever observed to arise from the exhibition of mercury for any diseases which were not venereal. Under every mode of treatment, they are obstinate; and, according to Mr. Carmichael, caustic and irritating applications are always injurious. The patient, he says, often recovers under the use of sarsaparilla, country air, and sea-bathing. One very tedious case yielded to Fowler's solution of arsenic, and pressure on the diseased parts with straps spread with equal parts of soap and strengthening plaster. ‡

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* Observations on the Symptoms and Specific Distinctions of Venereal Diseases, p. 21.

† Op. cit. p. 46. ‡ Obs. on the Symptoms, &c. of Ven. Diseases, p. 56

SECONDARY SYMPTOMS.

A syphilitic chancre, or a bubo, may occur without the general system being at all contaminated; but when the virus has been conveyed into the circulation, certain parts, susceptible of the effects of the venereal poison, are in danger of being contaminated, or (to use Mr. Hunter's language) may have the disposition to the disease communicated to them, which disposition is incurable by mercury, and must sooner or later change into action, or a state of palpable disease. Mr. Hunter describes the first order of parts which become diseased, in consequence of this diffusion of the virus through the system, as consisting of the skin, tonsils, nose, throat, inside of the mouth, and sometimes the tongue. The second order of parts, or those becoming affected in the latter stage of lues venerea, comprehend the periosteum, fasciæ, and bones. After what has been premised, it is obvious, that this description can only relate to true syphilis, and indeed, of the accuracy of the latter part of the account, doubts must be entertained, if it be established, that nodes hardly ever happen in syphilis, where no mercury has been employed.

At first, the skin is generally mottled with discolourations in every part of the body, no part being more susceptible than another. Many of these discolourations disappear *, while others continue, and increase with the disease.

In other instances, there are distinct blotches, which are often not observed till the scurfs are forming. In some cases, the eruptions come out in the form of small distinct inflammations, containing matter, and resembling pimples; but not so pyramidical, nor so red at the base.

Venereal blotches are often attended with a degree of transparency, particularly in warm weather. The degree of inflammation first attendant on the eruption soon goes off, and the cuticle peels off in the form of a scurf.

A copper-coloured, dry, inelastic, cuticle forms. This is thrown off, and a new scurf of the same kind is regenerated. These appearances spread to the breadth of a sixpence; but seldom more extensively, at least for a considerable time. Every succeeding scurf becomes thicker and thicker, till at last it becomes a common scab, and matter forms in the cutis

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* Though such is the observation of Mr. Hunter, I have known many eminent surgeons immediately pronounce an eruption not to be venereal, if any part of it died away, without the interference of mercury.

underneath, so that, at last, the blotch becomes a true ulcer, which usually spreads, although in a slow manner. *

According to the observations of Mr. Carmichael, when absorption of the syphilitic virus into the system takes place, ulceration of the throat is the earliest indication of the general disease; but, " the eruption in the skin is usually considered the first of the constitutional symptoms; and this, when truly syphilitic, is scaly, a circumstance, by which it may be distinguished from the eruptions of the pseudo-syphilitic diseases, which are either papular, pustular, or tubercular." † He describes the eruption as always consisting of scaly blotches, presenting either the character of lepra, or that of psoriasis, and unattended with any obvious degree of fever. His doctrines tend to establish the position, that this is the eruption which follows the absorption of the virus of a true chancre; that from a simple primary ulcer, patchy excoriation attended with discharge, or gonorrhœa virulenta, the eruption is papular ‡, preceded by fever, and ending in desquamation; that from the ulcer with elevated edges, without induration, the eruption is of pustules, in general phlyzacious, preceded by fever, and terminating in ulcers, covered with thin crusts, that heal from their margins, and when the disease is on the wane, the eruption desquamates into scaly red blotches; while the eruption, consequent to a primary phagedenic ulcer, consists of tubercles, or spots of a pustular tendency, or both intermixed, preceded by fever, and terminating in ulcers, covered with thick crusts, which often assume a conical form, healing from their centre, and extending with a phagedenic margin. In the decline of the disease, this eruption also desquamates into scaly red blotches. § Very able men, however, dissent from Mr. Carmichael's inference, that no eruption is to be regarded as syphilitic, which is not scaly. They assert, that a primary sore on the genitals, having none of the characters of a true chancre, will produce constitutional symptoms, attended with copper-coloured eruptions, resembling those of syphilis, but curable without mercury; and that while these eruptions are some-

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* See Hunter on the Venereal Disease.

† Essay on the Venereal Diseases, which have been confounded with Syphilis, &c. p. 39.

‡ In Mr. Rose's investigations, " it appears, that most of the papular eruptions followed ulcers which were not very deep, and which healed without difficulty." He adds, however, that he could not discover any uniform character in the sores, by which these papular eruptions were preceded. See Med.-Chir. Trans. vol. viii. p. 399.

§ See Synopsis in Carmichael's Obs. on the Symptoms and Specific Distinctions of Venereal Diseases, &c. 8vo. Dublin, 1818.

times even scaly *, true syphilitic eruptions sometimes assume the pustular form. † But, before we pronounce Mr. Carmichael wrong, I think we should follow exactly the line of discrimination which he has recommended; for, in certain stages of the disease, we find, that he himself represents certain eruptions as becoming scaly, which he does not regard as syphilitic. We should in particular consider whether the eruption is scaly from the first, or not; whether it is preceded with fever; whether the affection of the throat differs from what is usually considered syphilitic; and what is the nature of the pains of the limbs attending the disease? If we compare all these symptoms, as described by Dr. Bateman ‡, with the criteria of syphilis, particularly insisted upon by Mr. Carmichael, we shall immediately perceive that the latter gentleman would not have hesitated a moment about excluding such cases from the class of true syphilitic eruptions.

VENEREAL SORE THROAT.

In the throat, tonsils, and inside of the mouth, lues venerea generally makes its appearance as an ulcer without much previous swelling. Common inflammation of the tonsils often suppurates in the centre, so as to form an abscess, which bursts by a small opening; but this complaint never looks like an ulcer, which begins on the surface, like the true venereal sore; it is always attended with too much inflammation, pain, and swelling, to be venereal, and immediately the little abscess bursts, the swelling subsides. The complaint is also generally attended with febrile symptoms.

Another disease is an indolent enlargement of the tonsils, which is peculiar to persons disposed to scrofula. Portions of thick mucus, or perhaps coagulating lymph, lie upon the surface of the tonsils, and are frequently mistaken for sloughs or ulcers. When doubts exist, they may be cleared away by removing the matter with a probe, so as to shew, that there is no cavity beneath.

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* See Bateman's Hist. of a Tubercular Eruption of Syphilitic Appearance, but curable without Mercury in Med.-Chir. Trans. vol. v. p. 225.

† See Lond. Med. Repository, vol. iv. p. 516.

‡ Med.-Chir. Trans. vol. v. p. 226, 227. Mr. Rose has also repeatedly seen the scaly blotch in cases where mercury had been freely employed for the primary sores, and where he considered the virus as eradicated, disappear under the use of sarsaparilla. See Med.-Chir. Trans. vol. viii. p. 121.

An ulcerous excoriation of the tonsils is another disease liable to be mistaken for a venereal ulcer of these parts. This sometimes becomes very broad and foul, having a regular margin; but never extending deeply into the substance of the parts, like the venereal ulcer. If the observations of Mr. Carmichael be correct, excoriation of the fauces is mostly seen, as a consequence of the simple primary ulcer, patchy excoriation of the prepuce, or gonorrhœa virulenta, being the cases which he represents as giving origin to the class of symptoms, which he distinguishes by the name of the *papular venereal disease.* When the primary ulcer, with elevated edges, but without induration, is followed by sore throat, Mr. Carmichael finds, that the ulcers affect different parts of the fauces, and are in general of a white aphthous appearance. This is the sore throat which he describes as accompanying what he names the *pustular venereal disease.* In the *phagedenic venereal disease* of the same author, the ulcers of the throat also affect different parts of the fauces, and particularly the back of the pharynx, frequently occupying the whole of the fauces, and sometimes extending to the nares and larynx. The affection of the throat is "a white slimy-looking ulceration." The velum and uvula are occasionally destroyed, "so that in looking into the mouth of a person in this lamentable state there appears one vast continuous ulcerated cavity, covered with white viscid matter, and extending from the palate to the lower part of the pharynx."

The true venereal ulcer is a fair loss of substance, part being, as it were, dug out of the body of the tonsil. It has a defined edge, and is commonly very foul, having thick white matter adhering to it, like a slough, which cannot be washed * away.

This excavated ulcer of the tonsils, however, is not at present universally regarded as a peculiar symptom of the presence of syphilis, according to the former notions of this disease: we are assured by one very intelligent and impartial writer, that he has repeatedly seen such a throat cured by sarsaparilla. † This criterion is renounced even by Mr. Carmichael himself, who, in acknowledging the correctness of Mr. Rose's observation, tells us, that since the publication of the Essay, he has often noticed the excavated ulcer of the tonsils, "either attending the primary phagedenic ulcer, or the train of constitutional symptoms arising from it." ‡

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* See Hunter on the Venereal Disease.

† Rose in Med.-Chir. Trans. vol. viii. p. 421.

‡ Observations on the Symptoms and Specific Distinctions of Venereal Diseases, &c. p. 17.

According to Mr. Hunter, when the tongue is affected, it either becomes thickened and hardened, or ulcerates. We must not, however, fall into the error of believing all such affections of the tongue syphilitic; and, as far as my observations extend, this is an organ which is but rarely attacked by true syphilitic disease.

NODES.

The swellings of the periosteum, tendons, and bones arising from syphilis, are so called. The progress of the disease in this form is extremely slow, and attended with little pain. In some cases, however, the pain is considerable, particularly in the night-time. Nodes continue a long time before matter forms, and then it is a very imperfect kind of suppuration which follows.

Sudden swellings of the periosteum, without nocturnal pains, are not venereal. With regard to the affections of the bones, periosteum, fasciæ, &c., Mr. Carmichael lays down very clearly the marks of distinction of those really syphilitic, from those of the resembling diseases. Syphilitic nodes are indolent, slowly increasing swellings, attended with little pain and inflammation, until in an advanced state. On the contrary, the nodes of those diseases, which resemble syphilis, seem in the first instance to affect the periosteum and soft parts covering the bone, and not the bone itself, as swellings and redness of the integuments are seen from the very commencement. These swellings arise suddenly, increase with rapidity, and frequently disappear without mercury, as quickly as they arose. In short, they are of a much more inflammatory character, than syphilitic nodes. *

A very curious fact appears now to be established, viz. that nodes, corresponding to the description of those of syphilis, very rarely occur, except in patients who have used mercury for the cure of other venereal symptoms. The evidence, derived from the late extensive investigations in the military hospitals, all tends to the confirmation of this interesting point, of which the explanation is difficult, without supposing that mercury itself has the power of causing nodes; a conjecture that seems to be refuted by the fact, that except in syphilis, or its resembling diseases, we rarely or never see such an

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* Essay on the Diseases which have been confounded with Syphilis, &c. p. 45.

effect on the bones produced by mercury, however long and freely it may have been employed.

The bones, which are generally considered peculiarly liable to syphilitic nodes, are such as are superficial: for instance, the front surface of the tibia, the bones of the cranium, the triangular part of the ulna below the olecranon, &c. Some differences of opinion, however, prevail even on this subject: thus, the sternum and clavicle, which are mentioned by Mr. Carmichael, as two of the bones most liable to the disease, are supposed by some other surgeons to be never, or at least very rarely thus affected, though such bones, as well as the ribs, are not unfrequently attacked by what Mr. Pearson calls the cachexia syphiloidea. *

VENEREAL ULCERS IN CONSEQUENCE OF THE ABSORPTION OF SYPHILITIC VIRUS INTO THE CONSTITUTION.

It has been already stated that a venereal abscess, or ulcer, has the power of generating matter of a specific quality, and similar to that which first caused the disease. This remark, however, only applies to a chancre and a bubo; for, secondary venereal sores, or such as result from the general contamination of the system, do not secrete matter, capable of communicating the disease by contact, inoculation, or absorption.

TREATMENT OF SECONDARY SYMPTOMS.

The important fact, of late so unequivocally developed, that both the primary and secondary symptoms of syphilis may generally be cured without the aid of mercury, must of course be followed by an absolute rejection of the claim of that medicine to the character of being the specific for this disease; or the only remedy by which it can be cured. This position I hold to be incontestible, without the other distinct and different questions, concerning the utility of mercury in syphilis, and the propriety of renouncing its exhibition, being at all involved in the statement. That mercury generally expedites the cure both of the primary and secondary symptoms of syphilis is another truth, amply confirmed by the many coinciding accounts lately published. Yet, we are not to forget, that, in some states of the constitution, even when true syphilitic affections are present, or when ulcers, which were originally of this nature, have assumed the phagedenic, or sloughing form,

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* Rose in Med.-Chir. Trans. vol. viii. p. 421.

mercury is of all medicines the most unfit medicine to be prescribed, as, instead of effecting a cure, it increases, in a most dangerous manner, both the bad state of the general health, and the ravages of the local disease. In making also a due discrimination between the uses and abuses of mercury, we should ever be mindful of the undisputed facts, that mercury generally benefits not only the ordinary forms of syphilis, but a great many other diseases, both of a somewhat resembling, or totally different description; that a vast number of these disorders, whether cured under the use of mercury, sarsaparilla, guiacum, antimonials, the mineral acids, the nitro-muriatic baths, sea-bathing, or change of air, would in the end get well of themselves, or by the powers of nature, if the constitution could last long enough; that the efficacy of such means therefore is mostly limited to the abbreviation of these complaints; and that, with respect to mercury, or any other potent remedy, if it be not administered in such quantities as dangerously to impair the health, it will not usually hinder any sores, or other complaints from getting well, which are disposed to undergo a spontaneous cure.

We shall admit as the common belief, then, that mercury, though not essential to the cure of all those forms of disease, which are regarded as truly syphilitic, generally abridges their duration, and that on account of this important degree of utility, its exhibition in moderation, and in alterative doses, rather than in quantities calculated to produce excessive salivation, is right and advantageous.

It may be conveyed into the system, either externally by the skin, or internally by the mouth. In particular constitutions, mercury employed in one way seems to have no effect on the constitution or disease, and then it must be tried in the other. In the same manner, when one preparation of the medicine proves ineffectual, another should be tried, as the change is frequently followed by beneficial effects on the disease.

Sometimes the bowels can hardly bear mercury, and in this circumstance it is to be given in the mildest form possible, conjoined with other remedies for diminishing its bad effects on the viscera.

In general, the external employment of mercury is the most advantageous and convenient.

In giving mercury, the first attention should be to the quantity, and its visible effects at a given time; for when those effects have attained a certain pitch they are not to be increased, but only kept up, while the decline of the disease is watched; thus we judge of the invisible or specific effects of the medicine.

The visible effects of mercury are of two kinds; the one on the constitution, the other on parts capable of secretion. In the first, it appears to produce universal irritability, a quick pulse, &c. Salivation, or an extraordinary secretion of saliva, attended with soreness of the gums and mouth, forms the second description of effects. The latter affection is the criterion, by which practitioners have generally calculated the influence which mercury has over the whole constitution; but, from the facts already explained, it is a criterion which should be no longer adopted, as the cure of syphilitic affections may generally be accomplished, without subjecting the patient to all the distress and impairment of health, attendant on salivation. But, if it be deemed proper in some cases to resort to this test, the mercury should always be introduced into the system gradually, beginning with small quantities, which may afterwards be increased. At first, one scruple, or half a drachm of mercurial ointment may be rubbed in every night; and if the mouth in a moderate time should not be affected, the quantity must be gradually increased to one, two, or three drachms.

When mercury is given internally, and salivation is aimed at, there are three preparations commonly preferred in syphilitic cases; the pil. hydrarg. which may be given in the dose of gr. x. every night, either with or without opium, as circumstances may indicate; the oxydum rubrum in the dose of gr. i. with or without opium; and lastly, a solution of the oxymuriate of mercury (sublimate). One-sixth of a grain dissolved in brandy, or any aromatic water, or made up into a pill, and given twice a day, is the usual dose. When it is intended, however, only to put the patient on an alterative course, the doses need not be so large nor frequent; and the submuriate is very commonly preferred.

With respect to the preparations of mercury, in unequivocal cases of syphilis, the most simple are reckoned the best, not only in consequence of their acting with least violence on the system, but also because they prove more efficacious in the cure of the disease. Hence, frictions with the ointment, and the exhibition of the pil. hydrarg. are the most common plans.

It is incumbent on me to mention fumigation, another mode of introducing mercury into the constitution through the skin. It is one of the most ancient forms of administering this medicine, and was much praised in France by M. Lalonette. Mr. Abernethy has more recently spoken of the advantages of this plan in one of his publications, and he recommends a powder for the purpose, made by agitating the submuriate of mercury in water, mixed with the liquor ammoniæ carbonatis. The patient is placed in a machine, not unlike a sedan-chair, but having an opening at the top, out of which he can conveniently put his head. A heated iron is placed at the bottom of it, and when the powder is thrown on the hot surface of the iron, it sublimes, and is deposited on the surface of the patient's body. The patient afterwards puts on his flannel waistcoat and drawers. No doubt, it would be quite sufficient to fumigate the inside of the clothes, and then let them be put on with care.

This is a very expeditious mode of impregnating the constitution; and, though the recent elucidations respecting the general absurdity of exciting rapid and profuse salivations, must render this method by fumigation seldom eligible, yet, if the practitioner ever wish to affect the constitution very quickly with mercury, as may happen where ulceration of a suspicious nature is making rapid progress in the throat, the plan may have its advantages. When also a patient is too weak to rub in mercury, or to bear its internal exhibition, it may be very useful; though I doubt whether I have ever seen a single patient in this condition ever benefited by this medicine.

Besides mercurial fumigations applied to the whole surface of the body, with a view of affecting the constitution, some practitioners place considerable reliance in the efficacy of topical fumigations with the hydrargyri sulphuretum rubrum for improving the appearance, and inducing a healing disposition in certain primary as well as secondary syphilitic ulcers, which are backward in yielding to the ordinary employment of mercury. In the shops may be procured an apparatus, consisting of a stand, an iron heater on which the mercurial powder is to be thrown, and a tube for conducting the smoke to the part affected.

With respect to the principle on which mercury acts, the Hunterians suppose, that it cures syphilis, not by any chemical operation, but by exciting, in the constitution and parts affected, a particular action, which overcomes and removes that of syphilitic disease.

In the general observations, at the commencement of this chapter, some of the leading Hunterian principles, on which the treatment of the venereal disease is to be regulated, have been already mentioned. According to Dr. Adams, whenever we have cured a patient of the first local symptoms, we may assure him, that as long as he keeps out of the way of mischief, he is free from all danger of a relapse in those parts which have been cured; but we cannot pretend to inform him whether the disease will yet appear in his throat, skin, or bones. This uncertainty must remain for a few months, after the chancre or bubo has been cured.* So when the disease has reappeared in the skin or throat, and been cured, we cannot pretend to say, whether it will afterwards show itself in the bones, though we know that it will not again do so in the skin or throat. But when the primary complaints, and the secondary in the skin, throat, and bones, have all appeared, and been cured, we may regard the patient as free from the danger of future symptoms from the same stock of infection. As I have already related, the Hunterians explain most of the preceding circumstances, by supposing mercury to have no power of curing the disposition to the disease, but only the action or the palpable and perceptible forms of the distemper; and, by laying it down as a law of this disease, that the same order of parts can never be affected more than once from the same stock of infection.

With respect to syphilitic nodes, mercury is frequently incapable of removing the whole of the swelling: and, as Mr. Carmichael has observed, when a node remains after a judicious course, we should regard it merely as a simple enlargement of the bone, deriving no character whatever from its syphilitic origin. In such cases, blisters applied over the tumour, and kept open with the savin cerate, are highly beneficial.

In the treatment of the constitutional symptoms, described by Mr. Carmichael, as proceeding from the simple primary ulcer, patchy excoriation attended with discharge, or gonorrhœa virulenta, this gentleman has recourse to bloodletting when the fever is considerable, the pulse full and strong, and the tongue furred, with severe pains of the joints. He then opens the bowels and the skin by antimonials, and "when the febrile symptoms are reduced," throws in the simple or compound decoctions of sarsaparilla with antimonials, occasionally giving "the mercurial salts in alterative doses," when the disease is completely on the decline. When iritis, however, is a consequence of these primary affections, he recommends the free use of mercury, until the inflammation is subdued.

When there are phagedenic symptoms, Mr. Carmichael's practice is first to subdue the febrile excitement by bloodletting, daily repeated until the pain and fever have abated;

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* Observations on Morbid Poison, p. 163, 164. edit. 2.; and the Comment. on Hunter's Treatise on the Venereal Disease.

and he prescribes antimonials in nauseating doses, and opium; at the same time applying to the sores warm fomentations, with poultices of bread and water, or bread and a solution of opium; and confining the patient to bed, with the penis supported in the most easy and convenient manner. Cicuta, in large doses, and decoction of sarsaparilla, are afterwards given, "when the primary ulcer is accompanied with constitutional symptoms;" but when there are only constitutional symptoms, he prescribes "the decoction of the woods alone, or conjoined with antimony, or compound powder of ipecacuanha, or muriate of mercury." During the co-existence of the fever and tubercular eruption, or spots of a pustular tendency, Mr. Carmichael is an advocate for blood-letting; and, besides the general means recommended in his Essay, mentions arseniate of kali, nitrous acid, and nitro-muriatic baths. For phagedenic ulcers in the throat, he praises the same general treatment, with the application of oxymel æruginis, a strong solution of muriate of mercury, or nitrate of silver, or fumigations with the sulphuret of mercury. Should these remedies fail in curing these secondary symptoms, then, says Mr. Carmichael, "mercury may be used largely with advantage in checking the progress of the ulceration, even though it should exasperate the general disease." This mineral, he observes, increases the ravages of the disease in all its stages but the last. For ulceration and caries, the same plans are also recommended, and the pains in the joints and nodes are to be treated like those resulting from the primary ulcer with elevated edges. *

For the secondary symptoms, proceeding from the ulcer with elevated edges, without induration, and characterised by a pustular eruption, Mr. Carmichael advises blood-letting during the febrile state, followed by antimonials, sarsaparilla, guaiacum, tar-ointment, baths of sulphurated kali, or nitro-muriatic baths. Mercury, he says, is decidedly pernicious, until the pustules terminate in scaly blotches, instead of forming ulcers; and then mercurials, in alterative doses, conjoined with sarsaparilla and guaiacum, may occasionally be employed with benefit. The same general treatment is recommended for the white aphthous sore throat, often attendant on this form of disease, with common detergent or mercurial gargles; oxymel æruginis, and fumigations of the sores with the sulphuret of mercury. For the pains in the joints, Mr. Carmichael praises the same constitutional treatment, together with leeches, fomentations, bread and water poultices, blisters, and ointment of tartarized antimony. But mercury,

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* See Carmichael's Obs. on the Symptoms, &c. of Ven. Diseases.

he says, should be particularly avoided while inflammation of the knee exists. As for the nodes, resulting from the primary ulcer with elevated edges, he recommends the same general and local means, sometimes dividing the periosteum. When the preceding means prove insufficient, and the disease is on the decline, he allows that a mercurial course may be of advantage.

The same experienced and interesting writer has treated in his last publication of "anomalous disorders resembling the phagedenic disease, yet not of venereal origin." He adverts to Mr. Abernethy's doctrines respecting the connection which exists between disorders of the digestive organs and the production of local diseases, admitting, with the latter gentleman, that the surest method of curing these complaints is by improving the digestion and health in general. If, however, (says Mr. Carmichael) the patient is affected with an extensive and rapidly spreading ulcer of the throat, our treatment should be more active, than that of merely aiming at the improvement of the state of the digestive organs. It should, he remarks, be precisely such as he has recommended for those ulcers of the throat which attend the phagedenic disease, to which he has seen these spontaneous ulcers bear so strong a resemblance, that it was impossible for the eye to discover the difference. In most of the instances which he has seen, the eruption also possessed a strong resemblance to the large tubercular eruption, which he describes as often following the primary phagedenic ulcer; an eruption which he represents as extending into ulcers, with irregular, jagged, undermined edges, and which is generally best cured with nitrous acid, or sometimes with small doses of blue pill, or of the muriate of mercury, joined with sarsaparilla. Mr. Carmichael recommends the same general treatment for spontaneous nodes, with leeches and blisters; and if these means fail, he divides the periosteum, which, he says, is in such cases usually found much thickened. My limits here oblige me to quit this most interesting, but endless and obscure subject, to certain parts of which, however, I shall soon be obliged to return. *

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* Considerable weight will be given to some statements in this chapter, if the assertion, which I have occasionally heard, be true, viz. that in the latter years of Mr. Hunter's life, a very small proportion of the numerous venereal cases, for which he was consulted, were thought even by him to be truly syphilitic.

END OF THE FIRST PART.

THE

FIRST LINES

OF THE

PRACTICE OF SURGERY.

PART II.

PARTICULAR SURGICAL SUBJECTS.

CHAP. I.

INJURIES OF THE HEAD.

WE shall divide this extensive subject into remarks on superficial injuries; fractures of the cranium; pressure on the brain from extravasation; pressure on the brain from matter; concussion; phrenitis; the operation of trepanning.

SUPERFICIAL INJURIES.

Injuries of the scalp are not exempt from danger, as the integuments of the head have free connection with the parts within the skull by means of vessels. Contusions of the head sometimes occasion abscesses beneath the aponeurosis of the occipito-frontalis muscle. The matter ought to be evacuated as soon as its existence is ascertained; and, if possible, the opening should be made in a depending situation.

Contusions of the head, in other instances, produce an extravasation of blood beneath the aponeurosis of the occipito-frontalis muscle. This kind of tumour, when examined by the fingers, communicates a sensation so like that of a fracture, with depression of the cranium, as may be easily mistaken. Mild purges, however, and the lotion of vinegar and muriate of ammonia, commonly soon occasion the absorption of the effused blood.

Cuts of the integuments of the head, without injury of the skull, are simple wounds, unattended with any peculiarity. They admit of direct union, unless it be interrupted by incidental circumstances. Many contused and lacerated wounds of the scalp may also be united. The flaps, angles, and detached portions of these wounds, provided they are connected with the rest of the scalp at some point or another, ought never to be removed so as to cause an unnecessary exposure of the cranium; on the contrary, they ought to be carefully laid down, and, in very many instances, they will be found to live and unite to the surrounding part of the scalp. The success of the attempt will depend in a great measure, on the degree of contusion that has been inflicted.

I shall only mention, on this subject, one additional case of frequent occurrence, where the integuments of the head become affected with an erysipelatous inflammation, in consequence of a wound or bruise.

Erysipelas, the causes of which are frequently referrible to disorder in the functions of the liver and digestive organs, is a frequent complication of wounds in general, especially of those in large hospitals, where the bad air, and the crowd of diseased persons together, often induce a disordered state of the primæ viæ. But no wounds are more liable to be followed by erysipelas than those of the head; a circumstance explained by Pétit, Desault, and Bichat, by the supposition, that injuries of the head are particularly apt to disorder the hepatic functions, and thus produce a state of the constitution favourable to the occurrence of erysipelas. It is on the same principle, that these celebrated men, with their countryman M. Larrey *, attempt to account for the frequency of the abscesses found in the livers of persons who have died after injuries of the head; a thing which Richerand refers to the liver itself generally having suffered a concussion or mechanical injury at the same time as the brain. † But, whatever may be the cause of these events, the facts remain incontestible, that the head is particularly liable to erysipelas from wounds, and that disorder of the liver, and even abscesses in this organ are common consequences of injuries of the head. When erysipelas comes on, the pain in the head grows worse; uneasiness and oppression about the liver are experienced; the skin becomes exceedingly hot, and the pulse hard, small, contracted, and frequent. The appearance of

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* Mém. de Chir. Militaire, t. iv. p. 215.

† Nosographie Chir. t. 2. p. 245. edit. 4. 1815.

the wound at the same time becomes less favourable. If the injury be recent, its lips are puffed up and dry, without any secretion. Should it be already in a state of suppuration, the matter is yellowish and fetid. The tension of the scalp is considerable, and, if the attempts at resolution fail, abscesses are formed, and the matter is commonly discharged by openings, which take place behind the ears, in the upper eyelid, or other situations.

When the symptoms are still more intense, delirium and coma ensue.

When the symptoms partake less of the bilious character, they are not preceded by nausea, bitterness in the mouth, &c.; but the tongue is dry, and even reddish; the thirst is extreme; the pulse stronger and less contracted; the swelling is considerable, yet the skin is more red and tender than in the preceding case; the pain is acute and throbbing; the face is red, and the eyes inflamed; with which symptoms are frequently associated delirium, coma, &c. Such symptoms usually soon yield to bleeding and evacuations, but the tongue may afterwards become furred, nausea and vomiting succeed, and the bilious form of the complaint ensue.

The erysipelas of the scalp, attendant on wounds, has been erroneously imputed by several writers to an injury of the aponeurosis of the occipito-frontalis muscle, and pericranium; and extensive incisions, down to the skull, have been advised, for the purpose of removing the supposed tension of that tendinous expansion. I will not say, that there never is a case that can be benefited by such operation; but I will assert, with Bichat and Desault *, that it has been too extensively recommended, the affection being in most cases external to the fascia in question.

For a description of the treatment of the different forms of erysipelas, the reader must consult the first part of this publication, chap. 6.

FRACTURES OF THE CRANIUM.

When the breach of continuity in the bone is very fine, it is termed a *fissure;* when wide and open, it is named a *fracture.* When the fracture happens in a situation at some distance from the spot on which the external violence has immediately operated, it is denominated a *counter-fissure.* The skull, at the fractured part, either continues on a level with the rest of the cranium, or it is depressed. The inner table alone is sometimes broken, while the external one remains entire.

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* See Œuvres Chir. de Desault par Bichat, t. ii. sect. 1. art. 1.

Counter-fissures are never depressed, nor attended with splinters and fragments of bone. They can only happen when the head is struck by a broad flat body, in which case, the force tending to produce the breach of continuity is transmitted to all the bones of the skull, and if the part that is directly struck can make a resistance equal to ten, while another part can only make one equal to five, the latter is broken, and not the former. But, as the weapons and bodies with which blows are given mostly have angles and prominences, we see the reason why the cranium is generally fractured immediately where the violence is received.

Fractures of the cranium are in themselves by no means dangerous; that is to say, the simple breach of continuity in the bone, were it unaccompanied with other mischief, would rarely give rise to any serious complaints. In fact, fractures of the skull have often been known to get well without any bad symptoms whatever. The alarming symptoms, which sometimes originate when the skull is broken, are occasioned by the bone being beaten inward, so as to press upon or even wound the brain; or by the sharp irregular edges of the fracture irritating the dura mater, and making it inflame and suppurate; or else by mischief done to the parts within the cranium by the same force which broke the bone itself.

A fracture of the cranium, without depression, is not only itself unproductive of any dangerous effects, it is also unattended with any particular symptoms.* Its existence can only be ascertained by the eye or the touch, and therefore its diagnosis is only easy when it is exposed in consequence of a wound. However, a surgeon need not be solicitous to find out an undepressed fracture; nor is he warranted in making an useless incision merely to see the crack; for, if symptoms demand the application of the trephine, he is to apply it to the bone, whether it be fractured or not; and, if they do not require the operation, the fracture itself can never be a reason for the practice.

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* In Klein's Chirurgische Bemerkungen, p. 161., we find a remarkable proof of this observation: a man had his skull so badly broken, that, after death, the left half of it could with very little trouble have been separated from the right; yet, after the patient had recovered from the first stunning, which lasted an hour, he remained four-and-twenty hours absolutely without any bad symptom.

Bleedings from the nose, mouth, and ears, are no signs of a fracture of the cranium. The only inference from them is, that the force applied to the head has been violent; and even this conclusion is not a certain one; for, some persons have hemorrhages of this sort from very slight causes. Vertigo, paralysis, vomiting, loss of sense, &c. so often attending these cases, denote injury of the brain, and not a fracture of the skull.

Though a mere breach in the skull itself is not a source of danger, yet, considered as a symptom, it is of the highest importance. It shows, in the majority of cases, that very considerable violence has been applied; and, consequently, it excites a well-founded apprehension, that the parts beneath have at the same time been injured. These concomitant injuries are not, however, caused by the fracture, but are the direct effects of the same force which produced the breach of continuity in the bone. The surgeon, who considers these injuries as consequences of the fracture, directs his whole attention to the latter, searches for the causes of the bad symptoms beneath it alone, and often is unable to find them there.

Although the internal mischief is mostly situated beneath the place where the external violence has operated with most force, that is, beneath the fracture, yet it not unfrequently lies in a remote part. The same violence which breaks the cranium, may occasion a concussion of the brain, and extravasation of blood beneath the skull, and a subsequent inflammation of the brain and its membranes.

Even fractures, with considerable depression of the bone, are sometimes unattended with urgent symptoms; and, in this circumstance, the application of the trephine is unnecessary. We shall see, from what follows, that there can only be one genuine reason for trephining, viz. to remove such pressure from the surface of the brain, as gives rise to *existing* bad symptoms.

But whenever these symptoms accompany a depressed fracture, the sooner the bone is elevated the better. Sometimes the inner-table is depressed, so as to wound the dura mater and brain, and cause perilous symptoms, while the outer-table is merely broken, and not thrown out of its natural level. In the afternoon of the 19th of June, 1815, at Brussels, I trephined a soldier for such an injury, which he had received in the battle of Waterloo. He was lying quite senseless, with stertorous respiration, dilated pupils, &c. On dividing the scalp, he betrayed no signs of sensation; but no sooner had the trephine removed the depressed portion of bone, than he raised himself up, looked round, and began to answer every question put to him. What is still more extraordinary, he found himself so well, that he afterwards got up without leave, and put on his clothes. Under strict antiphlogistic treatment, this man recovered without a single bad symptom. Such a case is better than a thousand paper arguments in answer to Desault, who was so prejudiced as to renounce the use of the trepan altogether.

Klein always found cases in which a portion of the skull, including both tables, had been cut away with a sabre, less dangerous than others, in which only a piece of the outer had been cut off. The latter kind of injury, he says, was frequently followed by a fatal suppuration of the diploe. *

The only treatment which a fracture of the skull necessarily requires, consists in taking measures to guard against the inflammation of the brain; a consequence which is sometimes caused by the mechanical irritation of the fracture, but, in most instances, by the same violence which broke the bone itself. If we could ascertain, that the inequalities or pressure of the fracture caused the bad symptoms, we should be warranted in removing the fractured part with a trephine; but all we can rationally do in common cases, is to bleed the patient freely and repeatedly from the temporal artery and the arm, and prescribe antimonials, saline purgative medicines, and a low diet. The antiphlogistic regimen should be continued at least a month; for it is by no means uncommon for inflammation and abscesses of the brain to follow injuries of the head, a very considerable time after the patients have had reason to suppose themselves in perfect safety. †

PRESSURE ON THE BRAIN FROM EXTRAVASATION.

External violence, applied to the head, very frequently occasions a rupture of the spinous, or some other artery of the

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* Chirurgische Bemerkungen, p. 158.

† Some very interesting cases, illustrating this fact, are contained in Klein's Chirurgische Bemerkungen, 12mo. Stuttgart, 1801, p. 115, &c. In some of these examples, the patients remained well and sensible more than a month, and were then seized with fever, shivering, convulsions, paralysis, &c. which soon destroyed them. What is curious, it was sometimes found, that though the symptoms began thus late, and perhaps proved fatal in two or three days, a large portion of the brain and its membranes was inundated with matter, abscesses formed in its substance; parts of it destroyed; its membranes considerably thickened; and even the cranium broken. We must here suppose, either that such disease was going on for a time without producing any particular bad symptoms, or that its progress was most rapid after it had once begun.

dura mater; and a large quantity of blood becomes effused on the surface of this membrane beneath the cranium. In many instances, the blood is extravasated between the dura and pia mater, or in the very substance or cavities of the brain. Extravasations between the dura mater and any part of the base of the skull are mostly fatal.* When the blood lies between the dura mater and tunica arachnoides it is generally scattered about, and according to Desault can produce but little pressure on the brain, except when its quantity is considerable. If the extravasation happens in the convolutions of the brain, the blood is also widely diffused; but, when poured out in the ventricles, or substance of the brain, it is always circumscribed.†

The symptoms of pressure on the brain, whether that pressure be caused by a depressed portion of bone, by blood, purulent matter, or a foreign body, like a bullet, lodged between the dura mater and skull, are all of one kind.

In cases of extravasation of blood, the patient is usually stunned by a blow, from which state he sometimes soon recovers; while, in other instances, he remains stupid and senseless. When he regains his senses soon after the first effects of the violence have subsided, and afterwards gradually relapses into a drowsy condition, and then into a state which I am about to describe, considerable light is thrown upon the case by there having been an interval of sense. That the following symptoms cannot arise from the concussion is proved by the patient having recovered his senses, which he at first lost by being stunned; that the symptoms cannot be imputed to a depression of any part of the skull, is clear, because the patient would have continued senseless from the first; that the same symptoms cannot be attributed to matter beneath the skull is certain, because the time would not have been sufficient for the formation of matter, and there have been no symptoms of inflammation of the dura mater. Here any reflecting man must know, that hemorrhage beneath the skull must exist, and that in proportion as it increased after the accident, it alone has induced the bad symptoms under which the patient labours.

Unfortunately, much obscurity is frequently occasioned by the effects of extravasation taking place, before those of concussion have subsided, in which case not the least interval of sense returns, and we know not whether to ascribe the general insensibility to the former or the latter cause. But the worst cases of all are those in which concussion and extravasation are co-existent.

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* Œuvres de Desault par Bichat, tom. ii. p. 24.

† Op. cit. p. 25.

When the quantity of blood is at first small, drowsiness and head-ach may be the only symptoms. When, however, the pressure on the brain is augmented by the increased extravasation, the patient is gradually deprived of all sensibility, as in apoplexy. The eyes are half open; the pupil dilated; the iris does not move, even when a candle is brought near the eye; there is no sickness, which would betray sensibility in the stomach and œsophagus; the pulse beats regularly and slowly; the feces and urine pass involuntarily; and respiration is carried on with difficulty, and with a stertorous noise.

These symptoms indicate with tolerable certainty the existence both of extravasation and dangerous pressure on the brain; but it is to be lamented, that the surgeon has few or no means of judging with precision where the effused blood is situated, nor of course where he should perforate the cranium with the trephine. He neither knows whether the blood lies immediately under the skull, upon the outer surface of the dura mater; between the dura mater and tunica arachnoides; in the convolutions; in the ventricles; or deeply in the substance of the brain. Supposing it to lie upon the dura mater, he knows not the exact point of its situation.

The common rule in these cases is to apply the trephine to the place where any traces of external violence appear, the extravasation being often situated under that part of the skull which received the blow. Should an appearance of contusion be manifest on the scalp, after the head has been shaved and carefully examined; should the scalp be wounded; or lastly, should there be a visible fracture of the cranium; the perforation is to be made in the situation of such injuries. The practitioner, however, has often the mortification to find, that, in following this plan, the extravasation being elsewhere situated, is not brought into view. In this dilemma, if the dura mater should appear prominent at the opening, as if blood were under it, some surgeons advise a puncture to be cautiously made in it. This practice might indeed sometimes give vent to a small quantity of serum; but the blood, when in this situation, being always widely diffused, an effectual discharge of it can hardly be expected. I need scarcely state the absolute impossibility of giving vent to an extravasation more deeply situated.

Paralysis is a symptom of pressure on the brain, and when it seems to affect one side of the body more than the other; and one pupil seems more dilated than its fellow, we have great reason to suspect, that the extravasation is on that side, on which there is least paralysis, and least dilatation of the pupil. In the Hôtel Dieu, however, the extravasation has frequently been found on both sides of the head, or generally diffused, even though the paralytic affection was local.*

Mr. Abernethy has observed, that, when blood lies on the dura mater, the bone above it does not bleed when † scraped. This is a most valuable remark, if the criterion be found to agree with general experience.

The experienced Desault, during the last five years of his practice at the Hôtel Dieu, renounced the operation of the trephine altogether. He placed no dependence on the symptoms usually mentioned by writers as denoting extravasation, such as drowsiness, loss of sense, vertigo, stupefaction, and delirium. He believed that these symptoms might also arise from concussion, or inflammation of the brain. Paralysis of the side of the body, opposite that of the extravasation, as I have said, possessed not his confidence. He conceived, that paralysis might depend on concussion or inflammation. Convulsions of the affected side did not appear to Desault to be invariably attendant on extravasation, or not sometimes to arise from other affections of the brain. To convulsions and paralysis he imputed the spasmodic vomiting, the involuntary discharge of feces and urine, the dilatation, immobility, or contracted state of the pupil, &c., and consequently all these effects, according to Desault, may depend on a variety of causes, and cannot be characteristic of any particular one. His conclusion is, that there are no symptoms indicating with absolute certainty the existence of extravasation.

Admitting that extravasation can be ascertained by symptoms, Desault argues, that they afford us no information respecting the situation of the effused blood, and consequently, they are but an insufficient indication for trephining. He contends, that the detection of a fracture does little towards the discovery of the seat of the extravasated blood. Fractures often exist without extravasation, and extravasations frequently occur without fracture, or if they exist together, they may be very distant from one another. Desault found the two latter cases the most frequent of all. In most instances, in which the trephine is applied to the fractured part, effused blood is not found underneath the bone. Even when blood appears to issue from the fissure, says Desault, may it not proceed from the diploe?

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* Œuvres de Desault par Bichat, tom. ii. p. 27.

† Surgical Works, vol. ii. p. 47.

In the enumeration of the reasons for renouncing the trephine in these cases, the possibility of extravasation happening, without any dangerous symptoms, is noticed. Desault states, that this may happen when the blood is scattered between the membranes of the brain, or is shed very slowly, and lies diffused on the dura mater. Here, however, I may remark, that no surgeon would trephine, because the symptoms are the only true reason for the operation; nor without them would the extravasation be even suspected. With regard to the uncertainty of the diagnosis, I believe Desault was incorrect in denying the possibility of distinguishing the difference between the symptoms of extravasation and those of concussion, phrenitis, &c. Such discrimination has certainly been made with considerable success by Mr. Abernethy *; and some of the symptoms characteristic of the several cases, as related in this publication, will not be likely to be † confounded. It is principally in mixed cases, as when a man is labouring under the effects of concussion and compression together, and perhaps inflammation, that obscurity and uncertainty will be experienced.

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* Surgical Works, vol. ii.

† Klein relates a case which furnishes a useful caution: a little girl, five years old, fell out of a carriage, pitched upon her head, and the hinder wheel passed over her right side. She got up directly afterwards, with a considerable wound of the fore part of the scalp, five inches in length. In the course of a day or two, she became feverish, talked incoherently, vomited several times, and was exceedingly thirsty. Notwithstanding antiphlogistic remedies, the symptoms soon became worse; the child being in a state of stupor, and of a deadly pale colour, with twitchings of the face, stertorous and difficult respiration, a tremulous pulse, which could not be counted, involuntary discharge of the feces; frequent convulsions; inability to swallow, &c. The wound of the scalp had united very well at the edges, but the flaps were hollow, and from the cavity an unhealthy matter yet issued. Klein was required to apply the trephine, but he thought the symptoms not clear enough, and therefore waited. The child died, and on examination of the body the cranium and its contents were perfectly sound; but, in the chest, the right lung was found violently inflamed, and filled with blood; and a quantity of bloody serum in the cavity of the pleura. The posterior part of this membrane was exceedingly inflamed; a great quantity of blood extravasated between it and the intercostal muscles; and, to the surgeon's astonishment, the five first ribs fractured. See Klein's Chirurgische Bemerkungen, p. 141.

PRESSURE ON THE BRAIN FROM MATTER.

When a considerable collection of matter forms on the surface of the dura mater, it finally produces the same sort of symptoms as have been just described. But previously to their occurrence, the patient must have betrayed signs of an inflamed dura mater, while in the situation immediately over the collection of matter beneath the cranium, the symptoms of pressure from this cause must have been preceded by a puffy, circumscribed, indolent tumour of the scalp, and a spontaneous separation of the pericranium from the skull under such tumour. If a wound be situated immediately over the part of the cranium covering the suppuration of the dura mater, the edges lose their vermilion hue, and become pale and flabby; instead of healthy pus, a thin gleet is discharged, and the pericranium is loosened from the skull, for some extent from the edges of the sore.

This case demands the immediate application of the trephine, in order to give vent to the matter beneath the bone. The antiphlogistic treatment is also rigorously indicated, low regimen, copious bleedings, saline purgatives, antimonials, &c.*

CONCUSSION.

The first effect of concussion consists essentially in a sort of contusion, or general irritation of the brain, occasioned by the shock, which every part of this organ has received. The nature of such shock is readily conceived, when we recollect the way in which contusing bodies act upon the cranium. When the skull is struck, it changes its shape; it becomes flattened in the direction of the violence, and widened in the opposite direction, as happens in the same circumstance to every round elastic body. Hence, the brain suffers an universal shaking and compression, and having been contused and irritated, an increased determination of blood to it has then a tendency to take place. The truth of this doctrine is proved by experience, which teaches us, first, that, in the majority of cases, inflammation of the brain succeeds concussion; secondly, that the best method of preventing this secondary effect is to excite an artificial irritation, which counteracts the effects of that to which the brain has been subjected.*

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* Besides the kinds of pressure here specified, as requiring the trephine, there is another case particularly insisted upon by M. Larrey: I allude to the lodgment of a ball or bullet between the fragments of a fractured skull, or to the entrance of the same within the cranium, near some part of which it continues lodged. This author records one surprising case, in which he trepanned the os frontis, and removed an iron ball, that weighed seven French ounces, off the anterior and right lobe of the brain: the patient completely recovered. See Mém. de Chir. Militaire, t. iv. p. 183—185.

Whatever may be the nature of concussion, certain it is, that it may happen in very different degrees. How many varieties exist between that slight stunning, the sudden effect of an inconsiderable blow, and that complete disorganization, which, at the instant of the injury, annihilates at once all power of motion and every spark of life!

When the concussion has not been great, a transient stunning, a slight pain in the head, a little acceleration of the pulse, a vertigo and sickness sometimes immediately follow such accident; but none of these complaints last long, especially if evacuation has been used.† In certain instances, however, the dura mater inflames after slight blows on the head, and this at a period when sometimes there is not the least apprehension of danger.‡ If the violence has been great, the symptoms are as follow: the patient is at first stunned and in a state of total insensibility; his extremities are frequently cold, his pulse weak, slow, and intermitting; his respiration hardly perceptible; his power of motion abolished; in short, he is in a state which is the immediate result of the violent commotion which the brain has suffered. This is what Mr. Abernethy has so judiciously called the first stage of concussion. In proportion as the stupefaction, arising directly from the injury, goes off, (supposing the violence not to exceed a certain degree, for then no signs of returning sensation follow,) sickness, increased frequency of the pulse and respiration, more or less motion, and other symptoms take place, which are followed by marks of inflammation of the brain. The tendency to phrenitis gradually increases as the first effects of concussion subside. If the patient's eyelids are now opened, he will shut them again in a peevish manner; the pupil is contracted, and though the patient is regardless of slight impressions, he is not by any means insensible. As the case advances, the patient gets no sleep at all; has a wild look, an eye much like that of a person who has long watched through apprehension and anxiety; talks much and very inconsistently; has a hard labouring pulse; if not retained, he will get out of bed, and act with a kind of frantic absurdity; and, in general, he appears much hurt by a strong light. As the signs of delirium increase, the pulse becomes small, frequent, and even rapid. The inflammation under the skull may now produce suppuration, or a copious effusion of serum, and to the foregoing afflictions may be added those depending on the pressure of the secreted fluid. Stertorous respiration is said more particularly to indicate compression, than concussion.

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* Œuvres de Desault par Bichat, tom. ii. p. 57, 58.

† Pott's Chirurg. Works, by Earle, vol. i. p. 40. edit. 1808.

‡ For illustrations of this important truth, I would particularly refer to the writings of Pott, and Klein's Chirurgische Bemerkungen.

Death is the unavoidable consequence of violent concussion; such is then the extent of the disorder, that every means is incapable of re-establishing the functions of the brain. But when the injury, which this organ has received, is less considerable, its functions may be gradually restored in a more or less perfect state. Frequently the patient is for ever afterwards affected by the accident. Imbecility, loss of memory, and a marked change in the character are sometimes the permanent consequences. In certain instances, the patient's memory remains weakened, and he can only recollect things, which have very recently attracted his attention. Desault used to cite a curious case, in which the patient could at first only remember circumstances with which the mind had been lately impressed; but afterwards, he could recollect nothing, except what had happened in his childhood. * In the work referred to below, mention is also made of a lunatic, who was so fortunate as to recover his reason, in consequence of an accidental concussion of the brain. † Occurrences of the latter kind, however, are uncommon; but the same cannot be said of the confusion in the ideas, memory, &c.

I have already adverted to the curious fact of inflammation and abscesses in the liver being often found after death in the bodies of patients, who have received injuries of the head. Such affections of the liver were remarked by Desault to be very common consequences of concussion of the brain: he regarded them as fatal complications; and therefore laid much stress on endeavouring to prevent them. Perhaps, however, Desault carried his opinions on this subject too far; at least, inflammation and abscesses of the liver, in consequence of injuries of the head, have not been so often noticed in this country; and we have high authority for stating, that, in Germany, these affections of the liver are less frequent, than alterations of the spleen, after injuries of the head; and that they have been observed oftener after wounds of the shoulder-

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* Œuvres de Desault par Bichat, tom. ii. p. 59. † P. 61.

joint and chest, than after those of the head.* These facts throw considerable doubt on the theory about the disease of the liver arising peculiarly from a sympathetic connection between that organ and the brain, as insisted upon by Desault, Larrey, and others.

Nothing can be more opposite than the methods of treating concussion of the brain advised by different writers, and taught in different schools.

The treatment, of which I entertain the highest opinion, consists in taking away very copious quantities of blood repeatedly from the temporal artery and arm, giving antimonials, administering saline purges, and aperient clysters, and ordering a low diet. In the first stage of concussion, when all the animal functions are, as it were, at the lowest ebb, such measures every body will allow are not necessary.† While the system is in this state, cordials and stimulants may be allowable, but when the second stage arrives, which is invariably attended with a tendency to inflammation of the brain, or its membranes, the antiphlogistic treatment holds forth the best chance of preservation. Counter-irritation should also be excited on the outside of the head by a large blister, which may afterwards be kept open with the savine cerate. It is wonderful, what immense quantities of blood it is necessary to take away in these cases, in order to keep down the symptoms of phrenitis.

With respect to bleeding, Desault believed, that, in concussion, its utility was exaggerated.

In a few cases, where there was not much debility, nor biliary derangement, he bled the patients once; but he never carried the bleeding so far as to open a vein a third ‡ time. He preferred the stimulating plan of treatment, and especially that of keeping up a counter-irritation on the whole scalp with blisters, or the volatile liniment.

Others have not been content with external stimulants; but have had recourse to the internal exhibition of opium, brandy, wine, aqua ammoniæ puræ, æther, and the most powerful cordials.

Though Desault, however, at one time extensively adopted the blistering plan, he afterwards renounced it, in favour of the method of procuring evacuations by the antimonium tartarizatum. He thought, that this medicine, in particular, did good by producing an irritation in a different part from the brain, exciting the whole nervous system, creating a salutary perspiration, and promoting the bilious secretion, so as to counteract inflammation and suppuration of the liver, that consequence, of which Bertrandi, Pouteau, Desault, and others, have entertained the most serious apprehension. Desault commonly prescribed at first a grain of the antimonium tart. in solution; but he found it necessary to vary the dose considerably in different cases, one grain having as much effect in slight concussions as four in violent ones, where the sensibility of the viscera was much lessened. Whether the medicine acted as an emetic, or operated by stool, it did equal good. The remedy was not left off on the first subsidence of the symptoms; but continued uninterruptedly for six, eight, ten, or twelve days. Desault's object was not simply to produce evacuations; but also to keep up an irritation in a distant part from the head.

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* Klein, Chirurgische Bemerkungen, p. 136.

† Mr. Hey, among others, thinks copious bleeding injurious "during the diminished state of the vis vitæ, which immediately succeeds the injury." He has seen great benefit arise from the warm semicupium, and blistering the head after topical bleeding. Pract. Obs. in Surg. p. 486. edit. 2.

‡ Op. cit. p. 64.

It was for this reason, that he conjoined with the antimonial solution the use of purgative stimulating glysters. When the antimonium tartar. failed to produce relief, he was in the habit of trying what benefit could be derived from giving this medicine and blistering the scalp together. *

In taking leave of this subject, I must express my suspicions, that the affection of the liver and primæ viæ has been exaggerated by the French surgeons, since English surgeons in their dissections certainly do not find the liver frequently inflamed and suppurated in patients who have died of concussion; nor do they observe in practice so much of the bilious vomiting and tension of the hypochondria as Desault would lead us to expect. It seems to me, that the best way is, with Mr. Abernethy, to divide concussion into two stages. In the first, the system is senseless, and almost lifeless. Here, bleeding and evacuations are not essential, while stimulants and cordials can do no harm, and may perhaps do good by promoting the return of sensation, the action of the heart and arteries, the function of respiration, &c. But, in the second stage, when the first effects of concussion have subsided, and the disposition to phrenitis is about to commence, I think reason and experience are decidedly in favour of copious and repeated bleeding, evacuations, low regimen, and blistering the head. But, with this treatment, I see every reason to com-

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* Œuvres de Desault par Bichat, tom. ii. p. 66—69.

bine Desault's method of exhibiting the antimonium tart. in solution.

Schmucker, the eminent Prussian surgeon, derived from vast experience, in actual military service, excellent opportunities of witnessing a variety of injuries of the head from gunshot wounds. His observations are highly in favour of applying cold washes to the head, for the relief of concussion of the brain. His lotion is thus composed: to five gallons of cold water are added a pint of vinegar, a pound of nitrate of potassa, and eight ounces of muriate of ammonia. This mixture is kept for use in a cold place. In conjunction with this application, he recommends repeated bleeding, and stimulating clysters. When, under such treatment, the patient still continues senseless, Schmucker applies sixteen leeches, or more, to the neck, temples, or behind the ears. *

PHRENITIS.

Desault divides phrenitis, from injuries of the head, into two kinds, the phlegmonous and bilious. The first is described as being attended with hardness, frequency, and strength of the pulse; slow full respirations; broken sleep; redness of the tongue; animation of the countenance; excessive sensibility of the retina to the impression of the light; a full and wild appearance of the eyes; an acute throbbing pain in the head; general heat of the body; absence of all marks of gastric disorder; and, after a time, vertigo, loss of sense, delirium, coma, and convulsions.

In the bilious phrenitis, on the contrary, Desault represents the pulse as being contracted, frequent, and small; the fever characterised by a dull pain in the head, dryness and burning heat of the skin; yellowness of the face and eyes; bitterness in the mouth; nausea; bilious vomitings; clammy furred tongue; heaviness, pain, and tension in the region of the liver; deep yellow stools; frothy, greasy, saffron-coloured urine; a variety of gastric complaints; and (as in the preceding case) delirium, loss of sense, &c. though in a less remarkable degree.

Inflammation of the brain, and its membranes, is a case that generally requires a very free use of the lancet, and the operation is to be more or less frequently repeated, according to the patient's strength, and the state of the symptoms. There is an advantage in taking blood from the temporal artery; or,

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* See Chirurgische Wahrnehmungen, von J. L. Schmucker. Erster Theil, p. 154—158.

in conjunction with venesection, blood may be drawn from the temples by leeches, or cupping glasses. The skin ought to be kept moist with antimonials, which should be given in nauseating doses, so as to have the effect of suddenly lessening the impetus of the circulation. Counter irritation should be excited on the scalp with blisters. Laxative glysters, and saline purgatives should be administered. Acidulated beverages ought to be given, and, lastly, the diet be strictly antiphlogistic.

In the bilious form of the complaint, Desault chiefly trusted to the efficacy of procuring evacuations, by exhibiting the antimonium tartarizatum, in repeated doses; and he thought bleeding improper. *

OPERATION OF TREPHINING.

This operation consists in removing a portion of the skull, and is usually done for the sake of elevating a part of the bone producing dangerous pressure on the brain, or in order to give vent to collections of matter, or blood, which have the same effect: or to be able to extract a ball, or other foreign body lodged under the skull.

Every part of the cranium cannot be trephined with equal safety. The moderns have discovered, however, that the mere presence of a suture ought not to deter the surgeon from making the perforation in any place which seems advantageous. I believe, that the fears, respecting wounds of the longitudinal sinus, have been vastly exaggerated, and that if the situation of a depressed fracture, or extravasation, demanded the removal of a piece of the skull directly over this vessel, the operation would be justifiable.

The longitudinal sinus has often been wounded by spiculæ of the cranium, in cases of fractures; and it has been purposely punctured with a lancet, in order to bleed the patient; yet, the hemorrhage was never known to be troublesome, after placing a little bit of lint over the opening. †

But, though I feel warranted in making this statement, concerning the longitudinal sinus, I am not acquainted with any facts, showing that hemorrhage from the lateral sinuses would not be likely to prove more serious. These latter are much larger, and occupying the deep transverse furrows, in the

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* Œuvres Chir. de Desault par Bichat, t. ii. p. 69, &c.

† Cases in Surgery by J. Warner, p. 8. edit. 4.; Marchetti, Obs. 4. Sharp's Operat. p. 144. edit. 3.; Pott's Chirurg. Works, vol. i. p. 156—159. edit. by Earle, 1808.

middle of the inner surface of the os occipitis, a trephine applied over them would inevitably wound them.

Authors generally interdict the application of the trephine to the anterior inferior angle of the parietal bone, on account of the trunk of the spinous artery of the dura mater being situated in a groove on the inner surface of that part of the skull. For my own part, I should never be afraid of trephining here; for, if the above vessel were wounded, a little dossil of lint, introduced into the opening, would immediately stop the bleeding.

It is a maxim to avoid trephining any part, from which a complete circle of bone cannot be sawn, without hurting the dura mater. The inequalities of the inner table of the skull are, in several places, such as to make attention to this rule necessary. Thus, the centre of the forehead is rather an inconvenient part for the trephine, because, when the spine of the os frontis is prominent, it could not be sawn, without the dura mater being wounded by the teeth of the saw. Should the surgeon apply the trephine to this place, he must be careful not to saw too deeply; but, prefer separating the circle of bone with the elevator, to making any dangerous attempt to cut completely through the projecting spine.

Surgical writers caution us not to trephine over the frontal sinuses, and, not without reason; for, if we carry on the perforation in the direction in which we begin it, we shall certainly cut the inner table entirely through, on one side of the circle, before the other is at all divided. Yet, the frontal sinuses are not insuperable obstacles to the operation, if the outer table be first removed with a large trephine, and the inner table be then perforated with a smaller one, placed evenly and perpendicularly on the posterior surface of the sinus, as suggested by Mr. C. Bell. *

You cannot safely apply the trephine lower down on the fore part of the head than half an inch above the superciliary ridge of the os frontis, without risk of injuring the orbit. If requisite, the trephine may be applied to the squamous portion of the temporal bone; for, wounds of the temporal muscles are now not so much dreaded as they were by our ancestors. The unevenness of the os occipitis; the course of the longitudinal and lateral sinuses; and the way in which a part of this bone is covered by muscles; have made surgeons fearful of applying the trephine to it. However, there are two small spaces on each side of the groove for the longitudinal sinus,

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* Operative Surgery, vol. i. p. 439.

where a trephine may be safely applied. * The operation may even be done below the transverse ridge, near the foramen magnum, the muscles attached to that part of the bone being no valid objection, notwithstanding the assertion of writers †, as a division of them is not dangerous, while unrelieved pressure on the cerebellum would certainly be fatal. ‡

When the bone is already sufficiently exposed by a wound, the operation may commence at once; but otherwise, it is first requisite to make room for the application of the trephine, by making an incision of a crucial form, or shaped like the letters T or V. None of the scalp should ever be removed, as it is quite unnecessary, and might afterwards occasion serious deformity.

The incision should be made directly down to the bone; but, in cases of large fractures, attended with great separation of the broken edges, or with loose pieces, the danger of pressing too hard with the scalping knife is obvious.

Mr. Pott informs us, that a suture, or the impression of a vessel on the surface of the bone, may be discriminated from a fracture or fissure, by the undetached state of the pericranium. This membrane is always found loose and detached from the track of a fracture; besides which, the edges of a fracture constantly seem rough to the probe, or finger. The natural situation of the sutures is also a source of information to a surgeon, not deficient in anatomical knowledge.

It would be dangerous to apply the crown of the trephine on depressed portions of the skull. The perforation is always to be made on that side of the fracture at which the elevator may be most conveniently introduced beneath the depressed bone for the purpose of raising it, attention being paid to the anatomical objections to trephining in a few particular situations. In cases of extravasation, the perforation ought to be made at the place, where there are traces of violence done to the scalp; for, in most instances, the blood will be found beneath this situation.

When the scalp has been divided, and loose splinters of the cranium are found lying underneath, they ought to be taken away with the forceps or finger; they can only be regarded as extraneous bodies, the continuance of which may be productive of considerable irritation. The depressed pieces of the

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* See a case mentioned by Warner, p. 18. edit. 4.

† Bertrandi, Traité des Operations, p. 267. Paris edit. 1784.

‡ See a case illustrating the propriety of such practice, in Medico-Chirurg. Trans. vol. ii. p. 104.

skull, causing the bad symptoms, are sometimes completely detached from the rest of the cranium, and may be taken away in the same manner.

In every instance of fracture with depression, unattended with any motives for supposing that part of the pressure on the brain arises from extravasation, provided such depressed fracture can be raised with a pair of forceps, or an elevator, without applying the trephine, the latter operation may be dispensed with.

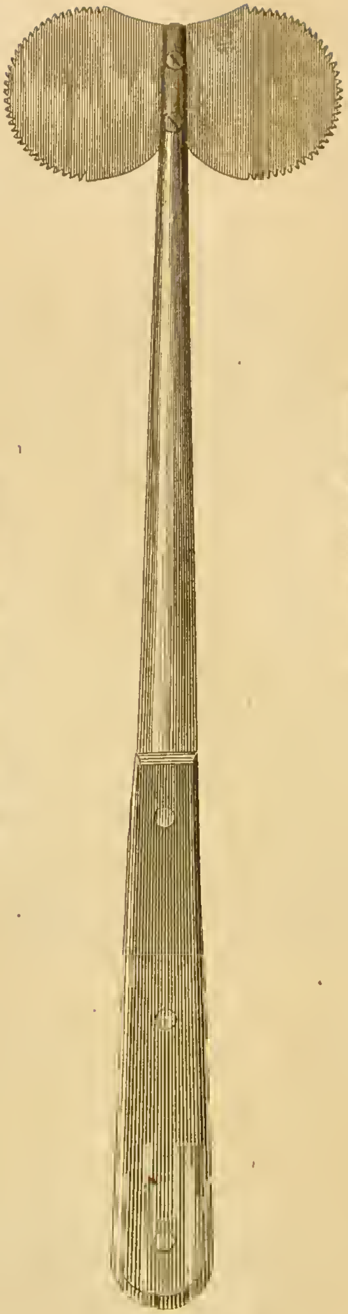
It is customary to scrape the pericranium from the part of the bone on which the crown of the trephine is to be placed; but, if this instrument cut well, no such proceeding is necessary.

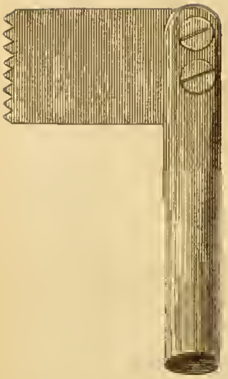
In order to fix the centre-pin of the trephine, surgeons make a small hole in the external table of the skull with an instrument named a perforator. The crown of the trephine is to be alternately turned in one direction, and then in the other by the pronation and supination of the surgeon's hand. As soon as the teeth of the instrument have made a circular groove, sufficiently deep for fixing the trephine, the centre pin is to be removed, lest it should injure the dura mater, before the internal table of the cranium is perforated. At first, the operation may proceed with briskness, as the surgeon cannot possibly do mischief; and, every now and then, the trephine is to be taken out of the circular groove, in order that the bone-dust may be brushed from the teeth of the instrument.

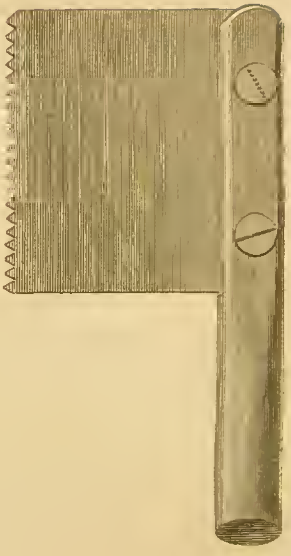
When the sawing is more advanced, the surgeon must proceed with greater caution, and frequently examine with the point of a quill, whether any part of the circle is nearly, or completely sawn through. When this is the case, the pressure of the instrument is to be inclined to the parts which are not sufficiently perforated. It is always better to use a little force in raising the circle of bone with the elevator, than to run any risk of injuring the dura mater and brain, by sawing too deeply.

In a few cases, the surgeon clearly perceives the entrance of the saw into the diploe, by the sensation which the instrument communicates to his fingers, in consequence of entering a soft substance, immediately after having divided the hard texture of the outer table, and by the blood which then appears in the circular groove, and on the teeth of the saw. The operator, however, is not warranted in sawing too boldly, until a criterion of this sort takes place; for, in many skulls, and in different parts of the same skull, the diploe is very thin, and, in old persons, it is sometimes quite obliterated.

Plate







When the surgeon knows with certainty that he has arrived at the diploe, the rest of the sawing should be accomplished with slowness and circumspection. After having removed the circle of bone, if the lower edges of the perforation next the dura mater are splintered, they may be made smooth by means of an instrument, called a lenticular.

When the whole track of the depression cannot be raised, or the whole quantity of blood or matter cannot be evacuated by making one perforation, the trephine must be applied again; and indeed as often as the circumstances of each particular case demand. Sawing out large portions of the skull, is a measure itself not exempt from the risk of bad and even fatal consequences; but it is certainly less dangerous than not completely effecting the object of the operation, viz. the removal of the pressure from the surface of the brain. The pain of the operation is here no objection; for the majority of patients, on whom it ought to be practised, are almost destitute of sensation.

When the operation is finished, the scalp is to be laid down in its natural position, and dressed very lightly with a pledget of any simple unirritating ointment.

The importance of preserving every part of the cranium, which the safety of the patient does not compel us to remove, is a truth with which I am forcibly impressed. Nor can it be disputed, that the trephine is often, as the experienced Mr. Hey has explained, an objectionable instrument, since the piece of bone sawn out must always be of one figure, whatever be the form of the fracture, and the quantity of bone removed must frequently be greater than the case requires.* Hence this judicious practitioner very seldom uses the trephine, or trepan, but saws resembling those delineated in the annexed † plate. With the convex one, the bone may be sawn in a curvilineal direction. There are undoubtedly numerous cases, in which it is unnecessary to remove a whole circle of the cranium for the purpose of raising a depression; for instance, if the fracture were shaped like the letter V, and beaten inward, by making a division across its base, the depressed portion might easily be taken away. Mr. Hey's saws are also highly useful in cases of diseased bones; for no instrument is so well calculated for the removal of large portions of dead bone, which are wedged in the substance of that which is living.

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* Practical observations in Surgery, p. 7. edit. 2.

† Plate 4.

CHAP. II.

OF ENCEPHALOCELE; FUNGUS, OR HERNIA CEREBRI.

WHEN a portion of the brain, together with its membranes, protrudes through a preternatural opening in the cranium, the disease receives the above appellations. There appear to be several varieties of this affection.

One case sometimes occurs in young children before the ossification of the cranium is completed, and then the tumour is covered by the common integuments of the head. In one example of this kind, the falciform process of the dura mater was found contained in the swelling. *

This species of encephalocele usually appears as a soft, smooth, round tumour, which has a pulsation corresponding to that of the arteries. It yields and disappears under compression, is generally unattended with any change in the colour of the skin, is formed in the situation of the fontanellæ and sutures, and its circumscription depends on the extent of the deficiency of bone. † The proper treatment of this case is to keep up a moderate pressure on the swelling. M. Ferrand successfully employed for this purpose a compress, containing a piece of sheet-lead, and fastened to the child's cap exactly over the tumour. The degree of pressure was increased or diminished, as occasion required, by tightening or slackening the cap.

Another species of encephalocele is rather to be regarded as a malformation, being the consequence of a congenital deficiency of an extensive portion both of the cranium and scalp. In such cases, the infant is generally still-born, or dies soon after birth. A remarkable example of this disease was published by Mr. Burrows. The scalp, the os frontis, the parietal, and a great part of the occipital bones were wanting. The cerebrum, which projected through the deficiency, was of a mulberry colour, and the tumour was adherent at its neck to the edge of the integuments. This child lived till the sixth day after its birth; it had no power of voluntary motion, and all the secretions were stopped. ‡ In one case, where there

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* Corvinus de Herniâ Cerebri, in Haller. Diss. Chirurg. t. ii. p. 335.

† Ferrand, Mem. de l'Acad. de Chirurg. tom. v.

‡ Medico-Chirurgical Transactions, vol. ii. p. 52.

was a deficiency of the skull at birth, the plexus choroideus was found in the contents of the tumour under the scalp; and, in another instance, the cerebellum.[*]

The foregoing kinds of encephalocele are rare compared with others, which sometimes follow the destruction of a part of the skull by disease[†], or the operation of trephining. In the latter case, the tumour generally arises a few days after the perforation of the cranium. It protrudes through an ulcerated opening of the dura mater, and very soon attains the magnitude of a pigeon's or hen's egg, the pia mater covering it seeming inflamed. As it enlarges, frequent hemorrhages occur, and its surface is commonly darkened with coagulated blood. In a few cases, it is not attended with loss of the mental faculties, though in most instances we find that coma, insensibility, and other marks of pressure on the brain, accompany the disease.

According to Mr. Abernethy, this singular malady seems to proceed from an injury done to a part of the brain at some distance from its surface, which injury produces a diseased state of the vessels, similar to what occurs in apoplexy. The morbid state increasing, one or more vessels give way, and an effusion of blood into the substance of the brain follows. This occurrence, if the skull were entire, would probably occasion apoplexy; but when there is a deficiency of bone, that allows the brain to expand, this viscus and its membranes protrude through the aperture. The dura mater soon ulcerates, and the tumour rapidly increases, in proportion as the internal hemorrhage goes on. At last, the pia mater, and stratum of the brain, covering the effused blood, give way, and the blood oozes out and coagulates.[‡] In the cases recorded by Mr. Stanley, however, the protrusion consisted both of the cortical and medullary substance of the brain, and the effused blood is described as merely lying upon the surface, and not extending thence to any other place, in which it had been originally effused.[§]

That all cases do not correspond with Mr. Abernethy's description is certain. Thus we have on record the account of a man who, without having any previous disease or accident, became afflicted with a pulsatory swelling, which originated from the substance of the anterior part of the left lobe of the brain, protruded through the os frontis, was as large as an orange, and on dissection was found to resemble the medullary matter of the cerebrum in appearance, and to be covered by an elongation of the dura mater. *

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[*] See Richter's Anfangsgr. der Wundarzneykunst, band. ii. p. 198. edit. 3.

[†] Richter's Chir. Biblioth. 2 B. 1 St. Seite 159.

[‡] Surgical Works, vol. ii. p. 51.

[§] See Medico-Chir. Trans. vol. viii. p. 12, &c.

Mr. C. Bell, however, as I conceive erroneously, represents the hernia cerebri as a true organized vascular growth from the substance of the brain, and not as a mere protrusion; though I entertain with this writer many doubts about the accuracy of Mr. Abernethy's explanation of the disease being a consequence of hemorrhage within the substance of the brain. What truth there may be in the idea, that the protrusion is chiefly owing to distension of the vessels of the brain, and to the effusion of a large quantity of serous fluid, I cannot presume to determine. Mr. Bell has seen the disease arise after an exfoliation of the two tables of the skull, when no blow had happened to cause any rupture of blood vessels within the brain; and he supposes, that the removal of bone and the ulceration of the dura mater always precede the growth of the fungus. †

The proper line of surgical conduct in such cases as follow trephining, is hardly yet determined. Mr. Hill successfully pared off the tumour with a knife in several instances ‡; and patients have been known to tear off the whole tumour without any particular ill consequences ensuing. § In the case recorded by Mr. Pring, the removal of the protruded mass, and the employment of pressure, were followed by the recovery of the patient. ‖ The French surgeons also recommend either cutting the tumour away, or repressing its growth by applying turpentine to it, and gentle pressure. ¶ In one instance lately published, the whole tumour, which equalled a small orange in size, "was sliced off with a scalpel," without any particular pain being excited. A profuse hemorrhage took place from the exposed surface of the brain, "the blood being thrown with great force, and to a considerable distance, from numerous vessels, which were attempted to be secured, but ineffectually, by ligatures. After a short time, however, the bleeding ceased." On examination of the part, which had been cut off, its exterior was found to consist merely of a layer of coagulated

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* Med. Trans. art. 18.

† Operative Surgery, vol. i. p. 428.

‡ Cases in Surgery, p. 91, 92.

§ Mém. de l'Acad. de Chirurg. tom. i. Mém. par M. du Quesnay, obs. 10.

‖ Edinb. Med. and Surg. Journ. vol. ix.

¶ Richerand Nosogr. Chirurg. tom. ii. p. 289. edit. 2.

blood, the rest of the mass was brain, possessing a natural appearance, the distinction between the cortical and medullary matter being readily seen, with the convolutions and pia mater dipping down between them. During the remainder of the day, on which the operation had been performed, the boy upon the whole was more tranquil. For the next two days, he remained much in the same state; but, on the third, he became worse; was completely insensible; had strabismus, and a remarkable quickness of the pulse. On the following morning he died." * When, under the use of mild dressings, the swelling continues to enlarge, Mr. Abernethy approves of Mr. Hill's plan of paring away the tumour with a knife; and when the symptoms of irritation and pressure on the brain still increase, he suspects, that the coagulum, from want of room to protrude, is spreading internally, or else by plugging up the orifice in the bone is confining fluid under the cranium. Here he suggests the removal of more of the skull.

On the whole, I think, that the evidence before us tends to sanction repressing the increase of the swelling by pressure, which, in cases where the tumour is already large, must be preceded by a removal of the protruding mass with a scalpel. I should also be inclined, considering the state of the brain generally, to combine with such treatment copious evacuations of blood. In one very interesting case, where the whole had been removed down to a level with the skull, the cut surface of the brain bled freely from numerous vessels of large size. Firm pressure was then made. The disposition to protrusion after a few days ceased. The protruded matter, which had hitherto resembled healthy brain, now put on another appearance. The exposed cerebral substance lost its natural colour, acquired a light yellow appearance; was split into several portions; and there exhaled from it a fetid odour. Its substance daily became softer, and the whole gradually wasted away. As the dead and putrid brain was detached, *fresh granulations rose up to fill the vacancy, evidently produced from the exposed substance of the brain.* During these changes, which occupied several days, the boy's health was good. At each dressing of the wound, moderate pressure was still made. By this means, the granulations, filling the space, before occupied by the protruded brain, became daily more flattened, and at length brought down to the level of the skull, when their cicatrization commenced, and proceeded with such rapidity, that, in a few days, the whole wound was perfectly healed, and the boy in every respect well. *

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* Stanley, in Med.-Chir. Trans. vol. viii. p. 15. The pressure, which was endured without ill effects in the examples related by this gentleman, is truly surprising.

Unfortunately these are generally complicated cases, the brain being deeply and extensively diseased. Thus, in the examination of one case, after death, it was found, " that all that part of the dura mater, adjacent to the ulcerated aperture, through which the brain had protruded, was black, sloughy, and much thickened. The exposed surface of the brain, from which the portion had been cut off, exhibited a softened and broken down texture; a state of disorganization, which extended deeply into its substance. About an ounce of fetid and dark-coloured fluid was found between the dura mater and arachnoid membrane, several small effusions were met with both between the membranes and in the substance of the brain. The arachnoid coat was thickened and opaque over each hemisphere," &c. †

CHAP. III.

FUNGOUS TUMOURS OF THE DURA MATER.

FUNGOUS tumours sometimes grow from the external surface of the dura mater, and, after destroying the superincumbent portion of the cranium, make their appearance in the form of an external swelling under the scalp. This disease is generally preceded by a blow or fall on the head, and occurs at the part to which the violence was applied. The French surgeons, who seem to have paid more attention to this subject than we have, conceive, that the disorder is in some instances an effect of syphilis; an assertion, however, which appears to me very imperfectly confirmed, being mostly founded on the accidental circumstance of certain patients afflicted with fungous tumours of the dura mater having previously had venereal complaints. But, frequently, on this principle, the disease might with equal probability be referred to several other morbid affections.

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* Stanley in Med.-Chir. Trans. vol. viii. p. 20—22.

† Ibid. p. 16.

As the fungus grows larger, its pressure against the skull, and particularly its pulsatory motion derived from that of the brain, occasion a slow and gradual absorption of the bone, just in the same way as an aneurismal tumour destroys any part of a bone against which it happens to press. The portion of the cranium immediately over the swelling being absorbed, the fungous excrescence meets with less resistance; it quickly protrudes through the opening in the skull; forms a prominent tumour under the scalp; and enlarges with increased rapidity. The severe pains in the head, which precede the appearance of the disease externally, become still more violent as soon as the fungus protrudes through the opening in the bone, and is irritated by the sharp inequalities of the edge of the aperture. The swelling has a manifest pulsation corresponding to that of the arteries, and when compressed, it either returns entirely within the cranium, or is considerably lessened. The pain then subsides, the tumour being no longer irritated by the irregular circumference of the opening in the skull. But should the size of the fungus be large, no relief can be thus obtained; for, when an endeavour is made to reduce the tumour, all the alarming symptoms of pressure on the brain are immediately excited.

Fungous tumours of the dura mater constitute an exceedingly dangerous disease, and mostly prove fatal.

Before a fungus of this description has made its way through the cranium, and projected under the scalp, so that its nature and existence can be ascertained, the practitioner has no opportunity of attacking the disease with any effectual means. The ordinary treatment of the severe pain occurring in certain parts of the head, after blows or falls on the cranium, and before the fungus protrudes, has consisted of bleeding and evacuations. But when the disease has manifested itself in the form of an outward swelling, the nature of which is recognised by previous circumstances, as well as by the pain which attends it, and subsides on its reduction, and its pulsatory motion; the surgeon should have the head shaved, make a crucial incision in the scalp covering the fungus, dissect up the angles, and fairly bring into view the whole of the tumour, and the margin of the opening through which it protrudes. But as it is impossible to get at the entire root of the fungus, while it is closely embraced by the cranium, it becomes necessary to saw away the surrounding bone. This object has generally been accomplished very inconveniently with the trepan or trephine, which, while it cuts away more of the cranium than is requisite, cannot effect the removal of every part of the bony circumference, and the surgeon has to break away the pieces betwixt the perforations with a gouge and mallet after the manner of the French surgeons. The best instruments for cutting away the surrounding part of the cranium, are the saws described by Mr. Hey, and represented in plate 4. of this work. With these, the division of the bone may be made in any direction desirable.

The root of the fungus being thus exposed, the next business is to cut the swelling away, which is most effectually done by carefully dissecting out the part of the dura mater with which it is connected.

The preceding operation is not practicable, when the fungus protrudes at the orbit, or very near the ear. The upper part of the head is evidently the most favourable situation for such a measure.

The excision of fungous tumours of the dura mater is far better practice, than applying ligatures or caustic to the disease. Tying these swellings would almost certainly induce a fatal degree of inflammation of the brain and its membranes; and with respect to caustic, (to say nothing of its inferior efficacy,) it is always liable to extend its action to the cerebrum itself. *

CHAP. IV.

WOUNDS OF THE FACE.

THE countenance being the place in which deformity is peculiarly conspicuous, it is always a great point to prevent the formation of ugly scars. Hence, it is an invariable maxim to endeavour to heal wounds of the face by the first intention.

As cuts confined to the soft parts of the face cannot be deep, adhesive plaster is generally sufficient to keep them closed; but, when the wound is situated in one of the lips, these parts are so incessantly in motion, that surgeons find it advantageous to maintain the sides of the division in contact by means of the twisted suture, of which I shall give a description in the chapter on the harelip.

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* See the Essay on Fungous Tumours of the Dura Mater, by M. Louis, in Mémoires de l'Académie de Chirurgie, tom. v. 4to.

When the edges of the wound are much contused and lacerated, some authors advise paring them off, in order to increase the chance of union, and lessen the vestiges of the future scar.

Sabre-strokes directed obliquely downward against the face, very often produce a wound attended with a flap, which should be immediately laid down in its proper situation again. When such flap is large and muscular, Richter thinks it best to use a suture at one or two points, as the strips of adhesive plaster are apt to become displaced, especially if the patient is restless, when the flap of skin, not being sufficiently retained, slips downwards, and the part is not healed without deformity.

Sabre-wounds sometimes break and splinter the bones of the face. The fracture, however, seldom extends far, because most of these bones are soft and spongy. Notwithstanding such injury of the bones, the wound of the soft parts frequently admits of being united, if the surgeon takes care to extract all the splinters, and put the surfaces of the division of the bones as evenly together as possible. Unless the fragments are quite detached, they should never be taken away, but be replaced as well as circumstances will permit. Their removal is not an easy matter; it occasions an unpleasant disfigurement; and experience proves, that all divisions of the bones of the face heal with particular readiness.*

A very terrible sabre-wound of the face is recorded by Mr. Hennen. The weapon struck an officer nearly across the eyes, one of which it destroyed; it then divided the parts downwards and backwards, to such an extent, that the pharynx could be seen.† Yet the injury healed in a very favourable manner, as indeed do all wounds of the face owing to its great vascularity. In some horrid cases, where the lower jaw is swept away by a cannon-shot, life is preserved; but, in general, the patient sinks under the accumulated tortures of his situation. "It is still, however, our duty (as Mr. Hennen observes) to try every expedient; and, after the ragged parts and splinters of bone are removed, the vessels within reach secured, and the suppurating process fairly established, we may endeavour to assist nature, faithfully following any effort she may make to fill up the chasm, but without allowing ourselves to count upon a showy or complete cure."‡ This gentleman saw a horrid-looking case in progress of recovery, in which nearly one half of the face had been carried away by a round-shot at Waterloo. Larrey has likewise recorded a similar case; and I witnessed in Holland a recovery of the same nature. It was the case of a soldier wounded at Bergen-op-Zoom, in 1814. All the lower jaw, and a large part of the upper, were in this instance completely torn away: there was very little hemorrhage, and no vessels required ligature.*

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* Anfangsgr. der Wundarzn. band. ii. p. 244. edit. 3.

† Observations on Military Surgery, p. 370. See also Larrey's Mém. de Chir. Militaire, t. iv. p. 20.

‡ Op. cit. p. 373.

Wounds of the lower part of the forehead or eyebrow, are sometimes followed by the disorder named *ptosis*, in which the upper eyelid hangs down more or less over the eye; but more commonly they give rise to an opposite complaint, called *lagophthalmos*, in which, from a contraction of the cicatrix, the skin is drawn up, and the upper eyelid cannot be made to cover the eye. But of these cases I shall have to speak in a future chapter.

Wounds of the eyebrows sometimes cause a species of blindness, named the gutta serena. This consequence is commonly thought to be owing to an injury of the nervous filament, which comes out of the orbit, at the notch in the superciliary ridge. It is probable, however, that the affection of the eye is not altogether dependent on the injury of the nerve; for the blindness very often occurs, when the cut is not situated near the track of the nerve, and frequently does not occur, when the nerve is known to be divided. It is when the wound is nearly or quite healed, that the event is most likely to happen.

Scarpa has set down the gutta serena, arising from an injury of the supra-orbitary nerve as absolutely incurable; but we know that this statement is not quite correct: for Mr. Hey has recorded † an example of amaurosis getting well, notwithstanding the disease originated from such a cause. Mr. Hennen also states, that he has met with one or two cases of amaurosis from wounds of the supra-orbitary nerve, the perfect division of which did no good; but, after a time, the eye partially recovered. ‡

Wounds of the eyelids scarcely admit of an effectual application of adhesive plaster, and are generally brought together with a suture. There are some practitioners, however, and amongst them is Professor Delpech §, who consider the use of sutures, even in these cases, quite unnecessary.

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* See also Larrey's Mém. de Chir. Mil. t. iii. p. 328.

† Medical Observations and Inquiries, vol. v. Scarpa says, he knows of only one such cure; which is recorded by Valsalva.

‡ Observations on Military Surgery, p. 366.

§ Précis des Maladies Chir. t. i. p. 346.

Incised wounds and sabre-cuts of the ear usually heal very favourably. Here a suture may be advantageous; but it need only be passed through the skin, and not through the cartilage. Ravaton has recorded a case, in which the ear united again, though nearly separated from the head; and it is important in every similar instance to make the attempt, since the loss of the external ear is said always to create a degree of deafness that obliges the patient for ever afterwards to use a hearing trumpet.

When a part of the nose is divided, but not entirely detached, it is the duty of the surgeon to replace it as expeditiously as possible. Adhesive plaster will suffice to retain it in its situation. Writers usually advise the nostrils to be kept pervious with soft flexible tubes, chiefly with a view of giving vent to the mucus which is secreted by the inflamed Schneiderian membrane, and which, if it could not readily escape, might prove exceedingly annoying to the patient. Putting out of the question Garengeot's extraordinary case, to which I have elsewhere adverted, we have many facts on record, showing not only that most incised wounds of the nose admit of union, but also, that contused ones, attended with an almost complete detachment of the part, may often be united. In one instance, the cartilaginous part of a young man's nose was nearly bit off by a horse; the separated piece only hanging by a thin portion of skin, yet after being replaced, and three stitches made, the part was united without any deformity. *

As the parotid duct passes beneath the integuments of the cheek over the masseter muscle, it is much exposed to wounds, which, if not properly treated, end in what are termed salivary fistulæ. This is the subject of the ensuing chapter.

CHAP. V.

SALIVARY FISTULÆ.

A SALIVARY fistula is an opening on the cheek, from which the saliva escapes, more especially, when the patient is

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* Richter's Chir. Bibliothek, 6 band, seite 538. See also Larrey's Mém. de Chir. Militaire, t. iii. p. 328, t. iv. p. 20, &c.

eating or talking. This secretion then flows out so profusely as to wet the patient's clothes. During a meal, two ounces of saliva have been known to escape in the short space of a quarter of an hour.* The great loss every day of a fluid so serviceable in digestion, is apt to occasion a loss of appetite, indigestion, weakness, and emaciation; and the constant dribbling of the saliva over the adjacent parts, is at least a vexatious annoyance.

A wound, ulcer, or gangrene extending either to the parotid gland or duct, is the cause of the malady. When the first part is interested, the fistulous opening is close to the ear; when the tube itself is concerned, the aperture is situated on the cheek. Sometimes calculous concretions form in the parotid duct, like what frequently happens in the salivary ducts under the tongue, in cases of ranula. They do not, however, generally produce much inconvenience before they are large, when they excite suppuration, the abscess of the cheek then bursts, or is opened; and, if the nature of the case should not have been previously suspected, it now becomes evident, from the quantity of saliva which is discharged from the aperture, the sore not healing, but becoming fistulous; and the facility with which the foreign body can be felt with a probe.†

When the parotid duct is recently wounded, an attempt may rationally be made to unite the wound by the first intention, in the expectation that one end of the duct itself may, at the same time, coalesce with the other. But when the wound has existed a good while, the latter hope would be vain; for the part of the parotid duct, detached from the gland, soon contracts and becomes obliterated, when the saliva ceases to flow through it in the usual manner.

The next plan most commonly pursued, is to apply a graduated compress to the fistulous aperture, or more properly just at its outer edge. M. Pipelet invented an instrument expressly for making the requisite pressure.‡ In this manner, fistulæ of the parotid gland itself may generally be very expeditiously cured. But when the fistula proceeds from the duct, the method is seldom proper; for the pressure prevents the excretion of the saliva, when it is secreted, so that its accumulation gives rise to a painful and œdematous enlargement of the gland, extending a considerable way down the neck. Thus it becomes necessary to remove the compress. We are informed, that the saliva has been known to accumulate in such quantities, that large drops oozed from the * skin. It must be admitted, however, that pressure has sometimes succeeded.

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* Richter's Anfangsgr. der Wundarzn. band. ii. p. 256. edit. 3.

† See an interesting case of this kind related by Flajani in his Collezione d'Osservazioni e Riflessioni di Chirurgia, tom. i. p. 4. Roma, anno 6.

‡ Mém. de l'Acad. de Chirurgie, tom. v. p. 869. tab. 19.

Desault cured a salivary fistula of the parotid duct by means of pressure, but quite on a new principle. After compression of the duct had been tried in vain, he laid compresses over the parotid gland, and bound them on the part with a roller, enjoining the patient to live entirely on liquid food, and abstain from talking. The bandage was tightened anew every day. By pursuing this method a certain time, the gland wasted away, its function was abolished, no more saliva passed into the duct, and the fistulous opening healed. According to Bichat, Desault frequently adopted this mode, and it is said, that there is no reason to apprehend any disorder of the digestive organs from a less quantity of saliva being secreted, as the opposite parotid, and the rest of the salivary glands make up the deficiency, by augmenting their secretion. †

The application of caustic to the fistulous aperture, is another means. This is practised with a view of producing an eschar sufficient to close the opening, and prevent the issue of the saliva. In order to make the slough continue undetached long enough for the fistula to heal underneath, it is recommended to bathe it frequently with brandy, or strong astringents. This plan cannot succeed, unless the outward aperture be very small, and the saliva have some other fistulous channel, by which it can escape into the mouth.

Efforts have been made to re-establish the obliterated part of the duct, by passing a probe from the fistulous aperture through it, and keeping it open by a seton, introduced in this manner into the mouth. A degree of success has certainly attended this method.

It is obvious, however, that there is no occasion to re-establish the obliterated part of the duct; and it is not so easily accomplished as making a new and more direct channel for the saliva into the mouth. This plan is also attended with greater success. The perforation is best made by means of a small trocar; and the puncture should be made so close to the end of the fistula, as to be as it were a continuation of it. The wound is to

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* Mém. de l'Acad. de Chirurgie, tom. 9. p. 44. edit. 8vo.

† Œuvres de Desault, par Bichat, tom. ii. p. 218—220.

be prevented from healing by a seton, which is to be worn a reasonable time.

Desault's method of applying the seton is unquestionably the most eligible. When the trocar had been introduced, he used to withdraw the stilette, and pass through the cannula a thread into the mouth. The tube was then taken out, and the seton was drawn, by means of the thread, from within the mouth outwards into the track of the wound; but care was taken not to draw it through the external opening, out of which the single thread alone passed, and was then fastened to the cheek with a bit of sticking plaster. The outer aperture was now dressed with lint, covered with compresses wet with the saturnine lotion. Thus the external opening had an opportunity of healing, with the exception of a mere point which soon closed; the seton, after being worn long enough, was taken out, and the little aperture touched with the argentum nitratum.*

The foregoing plan is much better than that practised by the famous Monro, who used to employ a seton, which was equally thick both in the inner and outer part of the wound. It is also more convenient, and more likely to succeed than the method which some practitioners have adopted, of leaving the cannula of a small trocar in the cheek, while attempts are made to heal the external opening.

During the treatment of these cases, it is necessary to make the patient refrain, as much as possible, from masticating or talking, and his confining himself to liquid food is highly advantageous.

CHAP. VI.

HARE-LIP.

THIS is, for the most part, an original malformation from the time of birth. In a few instances, it is the consequence of a wound. It is mostly met with in the upper lip, and very seldom in the lower one. Sometimes there is only one fissure; on other occasions, there are two. When, in the latter instances, the intervening substance is sufficiently broad and long, it is best to preserve it in the operation; but, if narrow and short, it should be cut away. In some cases, the fissure only extends as high as the middle of the lip; in others, it reaches to the nose, and even into one of the nostrils. In the latter circumstance, the nostril is very much expanded, and much wider than its fellow. Besides the fissure in the lip, there is frequently so large a cleft in the upper jaw and palate bones, as to convert the mouth and nose, as it were into one cavity. Sometimes there is a fissure in the soft palate, though, for the most part, this is perfect. In certain examples, the jaw-bone, or teeth, project forward into the cleft of the lip.

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* Œuvres de Desault, par Bichat, tom. ii. p. 221—225.

This case is not only a great deformity, but is attended with a defect in the speech; and when the fissure extends along the palate, more or less impediment to the power of sucking and swallowing also exists.

The hare-lip is cured by an operation, in which the surgeon pares off the margin of the fissure, brings the fresh-cut surfaces into contact, and keeps them in this position, until they have grown together by the first intention.

As infants are very subject to convulsions after operations, many surgeons think it best to defer that for the cure of hare-lip till a child is about two years of age.

In the operation, the object is to make the wound as smooth and even a cut as possible, in order that it may more certainly unite by adhesion, and of such a shape that the cicatrix may form one narrow line. The margins of the fissure ought never to be cut off with scissars, as these instruments always bruise the fibres, at the same time that they divide them.

Since the days of M. Louis, this last sentiment has been adopted by most of the first surgeons in Europe. Richter, Desault, and a few others, however, refuse their assent to it, contending, that, in practice, the knife has no superiority, and that scissars possess several advantages, as, for instance, fixing the part as well as dividing it, not requiring in general a previous separation of the lip from the gum, as the introduction of the piece of pasteboard or spatula does, on which the lip must be fixed, before the incisions can be made with a knife, &c.

The best plan is, either to place any flat instrument, like a spatula, the handle of a wooden spoon, or a bit of pasteboard, underneath the lip, and then cut away the edge of the fissure with a sharp bistoury, or to hold the lip with a pair of forceps, in such a manner, that as much of the edge of the fissure as is to be removed is situated on one side of the blades of the instrument, so that it can be cut off with one sweep of the knife.

This is to be done on each side of the cleft, and the two incisions are to meet at an angle above, thus Λ, in order that the whole track of the wound may be brought together, and united by the first intention.

The lips being exceedingly moveable, and it being essential in this case to heal the wound by adhesion, a particular process is always pursued to keep the lips of the wound in contact. Two silver pins, made with steel points, are introduced through the edges of the wound, and a piece of thread is then repeatedly twisted round the ends of the pins, from one side of the division to the other, first transversely, then obliquely, from the right or left end of one pin above, to the end of the lower on the opposite side, &c. Thus the thread being made to cross as many points of the wound as possible, greatly contributes to maintain its edges in even apposition. It is obvious, that a great deal of exactness is requisite in introducing the pins, in order that the edges of the incision may afterwards be precisely applied to each other in the proper manner. The pins ought never to extend more deeply than about two-thirds through the substance of the lip. It would be a great improvement always to have them constructed a little curved. This is what is named the *twisted suture.* The pins are usually removed in three or four days, the support of sticking plaster being afterwards quite sufficient.

That hare-lips may be cured without the employment of any suture at all, is a fact, of which abundant proof may be found in surgical authors. M. Louis, one of the most enlightened surgeons that ever flourished, has not only brought forward many plausible arguments in favour of treating these cases, without sutures, but has demonstrated the success of this practice in the instructive field of experience. He considered, that, in cases of hare-lip, authors generally recommended sutures, on the generally erroneous supposition of there being an actual loss of substance, and he was of opinion, that the only power to be surmounted, was the action of the muscles. Hence, he laid it down as a principle, 1. That the power, which is to bring the sides of the fissure in contact, should not operate on the edges themselves, but on the muscles, which draw them asunder: 2. This power should be made only by the uniting bandage: 3. The suture is a means of contact, and not of approximation, with regard to the lips of the division: 4. Adhesive plasters suffice for maintaining such contact, and, as not creating so much irritation as sutures, ought always to be preferred. *

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* See Mém. de l'Acad. de Chirurgie, tom. xii. and xiv. edit. 12mo.

These observations, however, have not been here introduced with any view of recommending M. Louis's method. His principles are correct, but his practice has this serious objection, that, unless conducted with more care and attention than the generality of surgeons will bestow, it is apt to fail. Indeed, its success, in some measure, depends on the child's remaining quiet, while the twisted suture cannot thus be disturbed, though the muscles may tend to separate the sides of the wound, their action is ineffectual, as long as the pins do their duty; and that the latter do almost constantly keep the lips of the wound effectually together, until the necessary union is accomplished, is proved by daily experience.

Hare-lips are frequently complicated with a fissure extending along the roof of the mouth. When such division is confined to the upper maxillary bones, it generally closes after the operation; but when it reaches along the palate bones and velum pendulum palati, its entire closure takes place with less frequency. Whatever was the form of the division in the palate, the experience of Desault taught him, that, if these cases did not invariably admit of an exact union, they at least underwent material improvement, the sides of the fissure becoming in time considerably nearer together. As, in these examples, the complaints arising from the imperfection of the palate are urgent, the operation should be done at an early period. *

When a hare-lip is complicated with a projection of the upper jaw forwards, the deformity may be of several descriptions.

Sometimes one upper maxillary bone exceeds the level of the other. When the hare-lip is double, a distinct part of the jaw pushes forward the middle portion of skin. In certain cases, one of the maxillary bones inclines backwards, and its alveolary process juts out. In other examples, an impediment to the union of the hare-lip arises from the projection of a tooth, which must then be extracted.

The projecting jaw itself has been treated in two ways. The common preliminary step to the operation for the hare-lip has consisted in cutting away the bony prominence. Such was the practice of Franco, and Van Horne, and various cases, in which it was done by Gérard and La Faye †, are on record. But, according to Desault, this measure is seldom

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* Œuvres de Desault, par Bichat, tom. ii. p. 203.

† Obs. sur les Becs de Lievre, &c. Mém. de l'Acad. de Chir. tom. 3. p. 181. in 12mo.

necessary, and always very painful. If an interval must elapse between the performance of this, and the attempt to cure the fissure in the lip, the patient must submit to two operations. Should both objects be undertaken at the same time, the inflammation excited may hinder the union of the wound. But, besides these things, an ugly depression of the bone always ensues, so that when the deformity of the hare-lip is removed, a disfigurement of the face yet follows, from the upper lip having no proper support. With these objections, another serious one is adduced, namely, the transverse diameter of the upper jaw is apt to diminish so considerably, in proportion as the two maxillary bones coalesce, that the upper and lower jaws no longer correspond, and the same kind of inconvenient mastication is produced, which may often be observed in old people. A case, illustrative of this fact, is related by Bichat. It happened in the practice of Desault, and, with the other reasons stated above, led this eminent surgeon afterwards to prefer reducing the projection of the jaw, by means of the pressure of a tight bandage. The method was found to answer every expectation; for, as there is always at the same time a fissure in the roof of the mouth, the bony prominence has little support, and readily yields. *

CHAP VII.

CANCEROUS DISEASES OF THE LIP.

WHAT is usually called a cancer of the lip, is met with in various forms; sometimes it has the appearance of an ulcerated, wart-like, excrescence, which occasionally becomes as large as an apple; sometimes it is seen in the form of a very destructive ulcer, which consumes the surrounding substance of the lip; and, in other examples, the disease resembles a hard lump, which at length ulcerates. The disease in its infancy is often no more than a pimple, which gradually becomes malignant.

Cancers of the lip are said to be more frequent in men than women, and generally to occur in the lower spheres of

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* Opere cit. p. 206—208.

life.[*] The under lip is commonly the seat of the disease, the upper one being but seldom affected.

Every obstinate hardness and ill-conditioned ulcer on the lips, is not to be regarded as cancerous; many may be cured by the remedies mentioned in the chapter on cancer. A course of emetic and purgative medicines has sometimes accomplished a cure. Black hellebore, internally administered, is said to be particularly efficacious. Keeping the constitution under the influence of either mercury, cicuta, or opium, may be tried; but, I believe, generally speaking, that arsenical preparations succeed better than any other medicines in curing the diseases of the lip, which most resemble cancer. The solution of arsenic may be taken internally in the way mentioned in the chapter on ulcers, or the medicine may be safely exhibited in the formula inserted below.[†] Very foul ulcers on the lips are occasionally quite dependent on the projection of a sharp rough tooth against the parts.

Whenever there is reason to believe that the disease is of an unyielding cancerous nature, the sooner it is extirpated the better. For this purpose, some surgeons admit the propriety of using caustic, when the whole disease can be completely destroyed by one application. But, as the action of caustic is not capable of being regulated with so much precision, as the extent of a wound can be, the knife is generally preferable: it is also the least painful.

The operation should be done as for the hare-lip, making the wound of such a shape as will allow its edges to be evenly united by adhesion, and taking care to extirpate every portion of the morbid part. When the affection is extensive, the surgeon, however, is frequently necessitated to remove the whole of the lip, a most unpleasant occurrence, as the patient's saliva can then only be prevented from continually running over his chin by some artificial mechanical contrivance; the deformity is very great; and swallowing, and the pronunciation of words, can only be imperfectly performed.

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[*] Pract. Obs. on Cancer, by John Howard, p. 54.

[†] ℞ Kali Arsenicati gr. ij. Aquæ Menth. Sativ. ℥iv Spir. Vin. ten. ℥j. Misce et cola. Dosis ʒij ter quotidie.

This formula, with double the quantity of kali arsenicatum makes also an eligible local application both for cancerous ulcers of the lip, and cases of lupus.

CHAP. VIII.

DISEASES OF THE ANTRUM.

THE antrum is the seat of various diseases. Its membranous lining may inflame and ulcerate; polypi, and other fleshy excrescences, may grow in it; the mucous secretion of the membrane may be of bad quality; and the opening through which the mucus naturally passes into the nose, may be closed. The bony parietes of this cavity may be carious, or they may form diseased protuberances, which may be compared to osseous fungi.

Penetrating wounds of the antrum may be caused by various weapons: it is liable to fractures; and, in gunshot injuries, extraneous substances may be forced into it. * In this elementary work, an account of the most common cases can only be expected.

INFLAMMATION AND SUPPURATION IN THE ANTRUM.

The diagnosis is at first not very clear. A darting pain is felt in the side of the face, extending from the teeth to the orbit, and unattended with any external swelling. The pain and tenderness do not affect the integuments, which may be handled without inconvenience to the patient. This state of the disorder is not attended with much fever, and is usually regarded as a tooth-ach.

In some instances, matter flows into the nose; and, its being discharged from one of the nostrils, excites a suspicion of the nature of the case. But many patients do not distinguish the pus from the usual mucous evacuation; and frequently, in consequence of the communication between the nose and antrum being closed, there is no purulent discharge whatever.

The disease, when further advanced, becomes more obvious. The whole antrum now expands, and its parietes are rendered thinner by absorption. The expansion of the bone towards

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* See two excellent dissertations " Sur les Maladies du Sinus Maxillaire par M. Bordenave, in Mém. de l'Acad. de Chir. tom. xii. and xiii. edit. 12mo. or iv. and v. 4to.

the nose may produce a complete obstruction of the nostril, or its swelling above may raise the floor of the orbit, and push the eye out of its situation. But the greatest degree of expansion commonly takes place towards the surface of the body; for, all collections of matter have a natural tendency to burst externally.

At length, the abscess makes its way through the bony parietes of the antrum, and continues to be discharged through ulcerated openings. In some instances, the matter finds a passage into the mouth, through one of the sockets for the teeth.

Although the diagnosis is generally rendered sufficiently plain by the foregoing train of symptoms, yet writers mention a few exceptions, in which the fistulous external aperture, being situated very remotely from the seat of the disease, as, for instance, behind the ear, no suspicion of the case being an abscess of the antrum would be excited, were it not for the swelling of the cheek, &c.*

The most common cause of suppuration in the antrum is a caries of one or more of the upper grinding teeth. The general causes, however, capable of exciting local inflammation in any situation, may here also have the same effect. An obstruction of the opening, through which the mucus flows from the antrum into the nose, may create such an accumulation of this secretion as shall occasion suppuration.

The indications in the cure are chiefly two, viz. to procure a vent for the matter confined in the antrum as speedily as possible; and to check the suppuration, and promote the separation of any exfoliations which are taking place.

When there is any carious tooth below the antrum, the surgeon should always extract it, as was first proposed by Meibomius †, for thus he not only removes a source of great irritation, but frequently makes at once a depending opening into the antrum. When the fang of the tooth does not extend quite into this cavity, the perforation must be completed with a sharp gimlet. Desault contends, indeed, that whether the fang reaches to this distance or not, it is always necessary to make the opening larger with a perforator. ‡ When all the teeth are sound, the third or fourth grinder is to be selected.

Desault used to enlarge the opening, after the extraction of the tooth, with a perforator, resembling that contained in cases of trepanning instruments; but he only employed a sharp-pointed perforator, when he had to drill a hole through the bottom of the socket; for, in other instances, where the object was merely to enlarge the opening, already extending into the sinus, he took care to employ a blunt-pointed perforator, with which there was no risk of injuring the opposite side of the antrum. This distinguished practitioner thought that the aperture should always be made large enough to be capable of admitting the little finger. The pain and swelling following the operation, are to be lessened by fomentations; and injections of barley-water and mel. ros. into the sinus may be usefully employed. *

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* See Poulain, Journal de Médecine, tom. xxxvi.

† Diss. de Abscessibus Internis, Dresd. 1718.

‡ Œuvres de Desault, par Bichat, tom. ii. p. 159.

Cases present themselves, in which fleshy or bony fungi, or detached portions of dead bone, are situated in the antrum, and in which it is requisite to make a larger opening into this cavity, than can be obtained at its lower part. Instances also occur, in which the patients have lost the grinding teeth, and the sockets are quite obliterated, so that a perforation from below can hardly be effected. Besides, the importance of the molares in mastication made Desault averse to extracting any of them, unless they were diseased.

In such cases, practitioners have usually followed the method; which was recommended in the Mem. of the French Acad. of Surgery, by Bordenave and Lamorier, and which consists in perforating with a small trephine the malar process of the upper maxillary bone. But there can be little doubt, that Desault's plan is preferable. After detaching the inside of the cheek from the bone, and exposing the surface of the latter, he drilled a hole with the perforator into the sinus, at the lower part of the fossa canina. The aperture was then enlarged to the requisite extent with the blunt perforator; the corresponding part of the gum was cut away, and a dossil of lint was placed in the opening. For a few days, the cheek was covered with an emollient poultice, and, after the removal of the dressings, the cure was completed by the use of gargles and injections, and taking care to keep the perforation open a sufficient time by occasionally introducing into it the little finger. The great recommendations of the situation in which Desault made the opening, were the thinness of the bone there, and the advantages arising from the part being less remote from the mouth.

The detachment of carious portions of bone is altogether the work of nature; the only way in which the surgeon can be useful, being to extract, through proper incisions, such exfolia-

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* Op. cit. p. 160, 161.

tions as are already loose. The fistulous sinuses generally require dilating, in order to allow the pieces of bone to be taken away. Afterwards, when the matter in the antrum has a depending opening, through which it can readily escape, the ulcerations usually heal spontaneously.

FUNGI OF THE ANTRUM.

The worst diseases to which the antrum is liable, are fungous and other tumours growing in its cavity, and producing first an enlargement, and then a destruction of its bony parietes. They frequently produce a complete impediment to the passage of the tears from the eye into the nose, and render the eyeball itself motionless, and amaurotic, generally after a time pushing it entirely out of its socket. The neighbouring teeth also gradually drop out. A sanious fetid matter is discharged from the nostril, the puncta lachrymalia, and even from the orbit. The excrescence makes its way through the palate and alveolary processes into the mouth, and, by expanding the bones, renders the adjacent nostril quite obstructed. At last, the swelling protrudes through the cheek, assumes a very frightful aspect, and, after attaining this degree, soon proves fatal, the patient dying in a comatose state. On dissection, the greater part of the upper maxillary bone is found destroyed by caries, while the fungous mass occupies not only the antrum, but the whole nostril. The caries sometimes extends to the os ethmoides and orbitar process of the os frontis, a good deal of the anterior lobe of the brain being also destroyed. Numerous are the unfortunate cases of this description on record *, and, in some of them, the want of spirit and judgment in the practitioners consulted in an early stage of the disease, is but too apparent.

The proper mode of treating this case is to trephine the antrum, as soon as the existence of the disease is known; and to make such a free opening into the cavity, that every atom of the fungus can be conveniently cut out. It is an unfortunate truth, however, that this terrible disease is seldom attacked in the bold and judicious manner advised and practised by the great Desault, who saw more danger in tampering with such a case, than in the most decisive measures.

The main object, which this surgeon always had in view,

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* See Flajani's Collezione d'Osservazioni e Riflessioni di Chirurgia, tom. i. p. 95., where three such cases are mentioned.

was to remove an adequate portion of bone, so as to allow the distemper to be effectually destroyed at its root. His practice consisted in drilling a hole in the antrum with the perforator, and then cutting away the anterior bony parietes of this sinus, with a strong falciform knife, constructed for the purpose; and, if with this instrument he could not remove bone enough, he scrupled not to effect his design by means of a gouge and mallet. Rather than suffer the disease to remain unextirpated, he sometimes broke away part of the alveolary process, with the corresponding teeth. As much of the fungus as could be cut away was then removed, and the surface from which it grew, was afterwards carefully cauterized. In England, the generality of surgeons would substitute caustic for the cautery; though I am decidedly of opinion, that, if the latter means be ever necessary, it must be in cases of this formidable character.

Tumours, growing from the antrum, are sometimes of a bony nature.

CHAP. IX.

FISTULA LACHRYMALIS.*

WHENEVER the tears cannot pass freely through the ductus nasalis into the nose, the lachrymal sac becomes distended, so as to form a preternatural tumour, situated just on one side of the root of the nose, below the internal angle of the eye. The contents of the sac, however, are not merely the tears, but also the mucus, which the inner membrane of the tarsus and the sac itself naturally secrete. In consequence of this state, the tears cannot freely enter the puncta lachrymalia; and, every now and then, a drop of this secretion falls from the

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* Lachrymal parts of the eye. Plate V. fig. 1.
a. b. The lachrymal sac.
c. The tendon of the *orbicularis palpebrarum* muscle.
d. Punctum lachrymale superius.
e. Punctum lachrymale inferius.
f. Caruncula lachrymalis.
g. Portion of the orbicular muscle reflected from the surface of the lachrymal sac.

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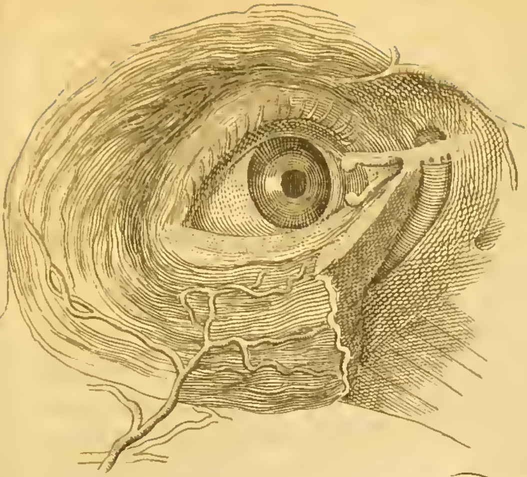

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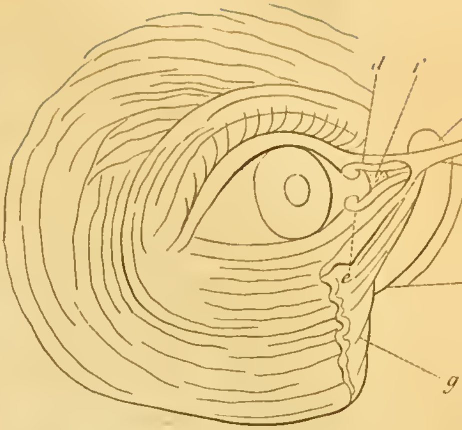

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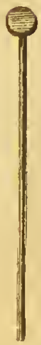

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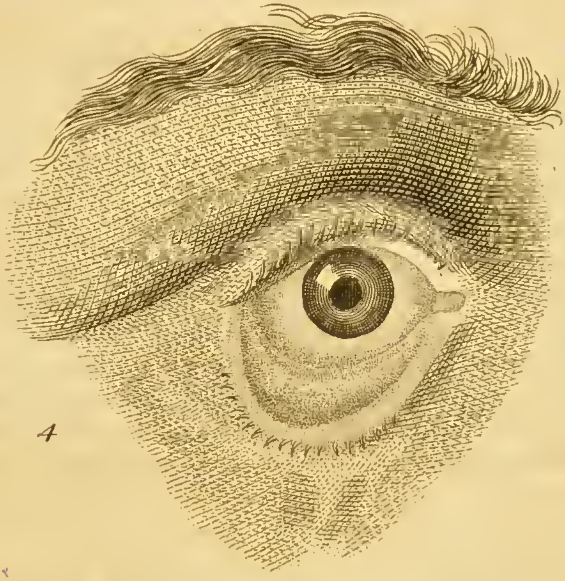

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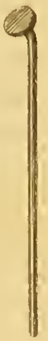

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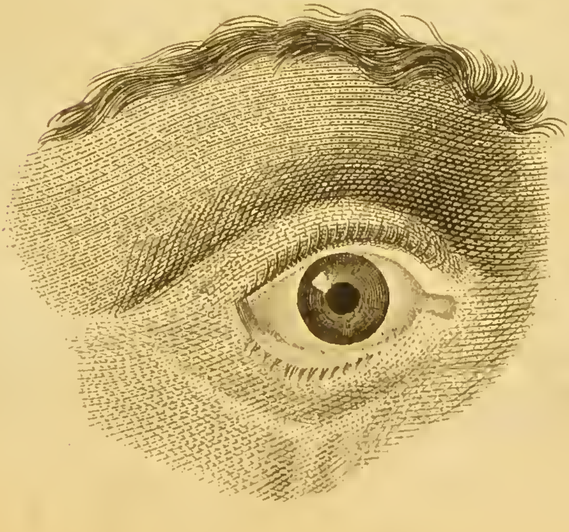

London, Published March 24.1819. by Longman & Cº. Paternoster Row.

II.

corner of the eye down the cheek.* On compressing the space between the eye and nose, the tumour is for a time diminished, in consequence of its contents regurgitating through the puncta lachrymalia; and also, in some measure, (when the obstruction in the nasal duct is slight,) by reason of their passing downward into the nose.

This is the first stage of the disease, absurdly named the *fistula lachrymalis.*

The second stage is, when ulceration has formed an external aperture in the lachrymal sac, which ulcerated opening is prevented from healing by the contents of the sac continually oozing through it. This state sometimes induces a carious affection of the os unguis, and thus the disease is rendered more complicated. In most instances, the neighbouring eye is more tender than in the healthy state, and, in some, it is always more or less inflamed.

Professor Scarpa asserts, that the chief part of the yellow viscid matter, which accumulates in the lachrymal sac is secreted by the lining of the eyelids, and by the little glands of Meibomius, and that the altered quality of this secretion has a principal share in the cause of the disease. He states, that the truth of this fact may at once be ascertained by turning out the eyelids, and especially the lower one of the affected side, and by comparing them with those of the opposite eye. The former will constantly exhibit an unnatural redness of the internal membrane, which appears villous along the whole extent of the tarsus, while the edges are swollen, and numerous varicose vessels are distributed on its surface. The follicles of Meibomius are also turgid and prominent.†

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* By the Germans, who are the most correct writers on the diseases of the eye, the case, in which, from relaxation and inadequate action of lachrymal puncta and canals, the tears are not duly conveyed into the nose, but collect at the corner of the eye, and fall over the cheek, is distinguished from that, in which the same symptom proceeds entirely from the secretion of a preternatural and profuse quantity of tears. The first case they call *Thränenträufeln,* or *Stillicidium Lachrymarum;* the second, *Thränenfluss,* or *Epiphora.* See Schmidt über die Krankheiten des Thränenorgans. Wien 1803, and Beer's Lehre von den Augenkrankheiten, 2ter band. S. 41. 8vo. Wien, 1817.

† Trattato delle Principali Malattie degli Occhi. Edizione Quinta. 2 vols. 8vo. Pavia, 1816. This I consider the best general work on diseases of the eye for a student; but the work of Professor Beer should be consulted by surgeons more proficient in the subject: it is entitled "Lehre von den Augenkrankheiten, 2 B. 8vo. Wien, 1813, 1817." The writings of Scarpa, Beer, and Ware, are far superior to those of the French oculist, A. P. Demours, whose expensive work has recently made its appearance under the title of "Traité des Maladies, des Yeux, avec

TREATMENT.

When the tears occasionally trickle over the cheek, in consequence of relaxation of the lachrymal points and canals, after inflammation of the eye, the disease, as I have said, is named by the very eminent Schmidt and Beer, *Stillicidium Lachrymarum*, which they describe as very easy of cure, the infirmity often ceasing of itself at the approach of warm, dry weather. And when surgical aid is required, the complaint almost always readily yields to astringent collyria. Beer recommends for this purpose a solution of borax in peppermint water, with camphorated spirit, or tincture of opium; or a solution of the sulphate of iron, or nitrate of silver, with an addition of the latter ingredients. These applications are to be dropped out of a quill several times a day into the eye, the patient lying down upon his back at the time, and for some minutes afterwards, in order that the operation of the remedy may not be immediately stopped.* With regard to the epiphora, which depends upon an augmented secretion of tears, and originates from irritability of the eye and its appendages, remaining after ophthalmy, Beer describes the complaint as generally so easy of cure, that it will subside with very little attention to the eye, such as the patient keeping himself in a pure, dry, and if possible, warm air; moderate exercise of the eye, especially upon varying objects, &c. But, in unhealthy irritable subjects, when the disorder is more obstinate, he enjoins, with the preceding plan, attention to diet, and the use of astringent collyria, the most effectual of which, he says, is composed of a solution of nitrate of silver, with a proportion of the acetite of lead and thebaic tincture. He also recommends the eyelids to be rubbed with the spiritus aromaticus, or a mixture of the eau de Cologne and tincture of opium.†

The first stage of the fistula lachrymalis, sometimes named in this country the *epiphora*, and by Scarpa called the *purulent palpebral discharge*, may frequently be cured by very simple means. I shall not enter into the question, whether

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des Planches coloriées répresentant ces Maladies d'après Nature," 4 tomes, Paris, 1818. The plates, however, are uncommonly well executed. Another valuable work which should be consulted, is Wardrop's Essays on the Morbid Anatomy of the Human Eye, 2 vols. 8vo. 1808, 1819.

* Beer, Lehre von den Augenkrankheiten, 2ter B. p. 43.

† Op. cit. p. 45.

the morbid state of the Meibomian glands, and of the internal membrane of the eyelids, is the cause, or only an effect, of the obstruction in the ductus nasalis, I think the discussion of this point quite superfluous; for, whether it is one or the other, it is proper to follow the same practice, namely, to make such applications to the inside of the eyelids, as have a tendency to improve the quality of the secretion from them, and to endeavour to restore the free passage of the tears into the nose.

While the lachrymal sac is entire, that is, while the disease is not in an advanced state, the most judicious plan, which the practitioner can possibly follow, is to inject warm water into the lachrymal sac, through the lower punctum lachrymale, by means of Anel's syringe. This is done with a view of mechanically washing away any thickened mucus, or other matter, which may obstruct the ductus nasalis. The fluid should be injected so as to make it pass, if possible, with some velocity into the nose. In 1780, Sir William Blizard proposed the injection of quicksilver, by means of the tube commonly used by anatomists for injecting the lymphatics; but the late Mr. Ware's preference to the syringe, is, I believe, perfectly well founded.* The lachrymal sac, and ductus nasalis, should be washed in this manner at least once every day.

At the same time, the patient should employ a collyrium, composed of five grains of the sulphate of zinc dissolved in four ounces of aq. ros.; or he should introduce upon the point of a blunt probe, every morning and evening, between the eyelids and eyeball, a small quantity of the ung. hydrarg. nitrat. lowered; or of an ointment, consisting of half an ounce of hog's lard, two drams of Armenian bole, the same quantity of prepared tutty, and one drachm of white precipitate. This is Janin's famous opthalmic ointment, and it must be used, at first, blended with twice or thrice its quantity of lard.

These applications to the inner surface of the eyelids operate very beneficially on the disease, by correcting the morbid secretion transmitted into the lachrymal sac. Perseverance in this kind of treatment, for two or three weeks, will often effect a complete cure; and Scarpa's practice, whatever we may think of his theory, is undoubtedly commendable.

When the above measures have not the desired effect, or when there is already an ulcerated aperture in the sac, Mr. Ware's method is to be put in practice. A small puncture is to be made into the sac, when there is no external opening, or if this should be unfavourably situated. A very narrow, long-pointed, lancet is the best instrument for the purpose. Then a silver probe, somewhat smaller in size, than what is commonly contained in an ordinary pocket case of surgical instruments, is to be introduced through the small puncture into the lachrymal sac, and then down the ductus nasalis into the nose, so as to clear away all mechanical obstructions, and restore the pervious state of the natural channel for the tears. The ductus nasalis is to be kept from closing again by a silver style (Plate V. figs. 2. and 3.) of about the same diameter as the probe, and formed with a flat head, like that of a nail, only placed obliquely, in order that when the instrument is placed in the duct, the top may lie in close contact with the skin covering the sac. The style for an adult should be about an inch and a quarter, or an inch and three-eighths in length. When it is judged necessary to make a small perforation in the os unguis, with a view of forming an entirely new passage from the sac into the nose, the style is also to be worn as in the preceding case. * If the lining of the eyelids be in a morbid state, Scarpa's applications are also to be used.

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* Obs. relative to the Epiphora. &c. p. 9.

The style produces so little inconvenience (and one might say no deformity, as its head being blackened has the appearance of a small bit of court plaster), that the patient is generally very careless about relinquishing its employment. The only thing necessary to be observed, is, to withdraw and clean the style twice a week †, and inject warm water through the external opening down into the nose. At the end of six weeks, the instrument may be commonly left off, and the aperture allowed to heal.

When the os unguis is carious, it may in some instances be proper to make a larger opening into the sac, in order to endeavour to cut away any tedious exfoliations. But, now, that the practice of cramming the sac with tents, escharotics, &c. has given place to the mild methods above explained, caries is found to be a much less frequent occurrence.

The troublesome ulcerations, sometimes attendant on the fistula lachrymalis, commonly heal soon after the ductus nasalis is rendered pervious by the introduction of the probe. In a few examples, this desirable event is prevented by con-

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* See remarks on the Fistula Lachrymalis, &c. by J. Ware.

† When this is neglected an earthy crust may collect on the part of the instrument which projects into the nostril, and render its extraction painful and troublesome. Scarpa, op. cit. Case 8.

stitutional causes, which may generally be removed by the exhibition of bark, and small doses of the oxymuriate of mercury.

CHAP. X.

DISEASES OF THE EYELIDS.*

INFLAMMATION OF THE EYELIDS, OR PSOROPHTHALMY.

IN the purulent ophthalmy, a thick viscid kind of pus is always found on the edges of the eyelids, gluing them together. The glands of Meibomius are probably the chief source of this discharge. The inflammation generally affects only the edges of the eyelids; but, sometimes, it extends to every part of them, and even to the cheek, where it creates an erysipelatous swelling. The inner edges of the palpebræ are often ulcerated.

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* The disorders of the eye and its appendages are far more numerous and diversified, than those of any other individual part of the body, and some of the requisite operations for their relief, ought to be done with the nicest combination of skill and delicacy. These circumstances, strangely enough, have had the effect of inducing an erroneous supposition, that such cases do not properly enter into the department of ordinary surgery; but ought to be consigned to the care of a man who makes them exclusively the object of his attention, and disregards disease in every other form. The morbid affections of the eye, it is true, like all other surgical cases, must be studied, in order to be understood. They have no peculiarity, however, except what depends upon their number, and the tenderness, and functions, of the organ affected. In their nature, they are swayed by the same laws, which influence all the common diseases, for which the practice of surgery is instituted; and their treatment is regulated by general principles, which prevail throughout the whole of this indispensable art.

No one except the thorough surgeon can make the complete oculist; by which last term is not meant any body who can merely manage to extract the cataract better than the generality of surgeons; but a man whose science leads him to recognize the analogy betwixt the diseases of the eye and those of other parts, and whose knowledge of the latter, while it qualifies him in a great measure for the treatment of the former, gives him a decided superiority over the bare oculist.

" On a cru faussement (says the intelligent M. Louis, in adverting to the diseases of the eye) que le sçavoir nécessaire pour discerner le caractere de ces diverses affections contre-nature, et pour y remédier, faisoit en quelque sorte un art particulier. Mais quels fruits pourroit porter cette branche, étant separée du tronc? Il est bien prouvé, par les faits, que les progrès de cette partie de la Chirurgie ne sont dûs qu' aux grand Mâitres qui ont pratiqué l'Art dans toute sa plénitude, et dont l'expérience, relative aux maladies des yeux, a été éclairée par les lumieres que leur avoient données les principes qui constituent indivisiblement la science, sans laquelle on ne peut exercer aucune partie avec connoissance de cause." Vid. Mém. de l'Acad. de Chirurgie, tom. xiii. p. 262, 263. edit. 12mo.

Formerly these cases used to prove exceedingly obstinate, and, on the supposition of the disease being scrofulous, various internal medicines were often exhibited, but too frequently without the desired effect. Among other things, the extractum conii, bark, submuriate of mercury, sea-water, sea-bathing, and a variety of mineral waters, were commonly tried. Although Mr. Ware acknowledges, that psorophthalmy is sometimes accompanied with the plainest marks of a scrofulous constitution; yet, he believes, that it mostly takes place independently of any other complaint; and he thinks, that however judiciously the preceding, or other internal remedies may be prescribed, they are absolutely insufficient of themselves, and must be assisted by proper applications to the part affected. In short, it was this gentleman who first proposed the successful practice of smearing the edges of the palpebræ with the unguent. hydrarg. nitrati. Let the ointment be put into a small box, and warmed before a candle, till the top is melted into an oil. This oil is to be taken off upon the end of the fore finger, or (what is unquestionably preferable) upon the point of a small pencil brush, and carefully rubbed into the edges of the affected eyelids. The use of it once in twenty-four hours is sufficient; and the best time is when the patient is going to bed. As soon as the pain, excited by the application, has subsided, a soft plaster of ceratum album is to be loosely bound over the eyelids, in order to keep them from sticking together in the night. Still, the eyelids cannot in general be altogether prevented from becoming adherent to each other, and more or less difficulty attends the separation of them in the morning. Hence, Mr. Ware recommends cleansing them with milk and fresh butter, well mixed together, and warmed. This application will gradually soften the incrusted matter, and enable the patient to open his eyes without pain.

When the disease is attended with inflammation of the eyeball, the same gentleman advises the vinum opii to be also used, in the manner described in the chap. on ophthalmy. *

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* See Ware's Remarks on Ophthalmy, Psorophthalmy, and Purulent Eye, p. 123, 124. edit. 3.

LIPPITUDO.

A chronic inflammation of the lining, and particularly of the edges of the eyelids, is termed *lippitudo*. The eye seems to be surrounded with a red circle, and the palpebræ cannot be easily opened in the morning, owing to a morbid secretion of glutinous matter.

The most successful treatment is to wash the eye frequently in the day time with a collyrium, containing the sulphate of zinc, and to melt a little of the unguent. hydrarg. nitr. in a spoon, and smear it over the inner surface and edges of the eyelids at bed-time, with a hair pencil. In many instances, the complaint is very obstinate, and requires the exhibition of alterative medicines.

PURULENT EYES OF INFANTS.

In new-born children, a peculiar inflammation of the eyelids, very remarkable for its suddenness and rapidity, is sometimes seen. These parts become red and swollen, and a yellow, thick, purulent matter is discharged, which sometimes covers the whole front of the eye-ball.

According to Mr. Saunders, the inflammation commences with a slight redness on the inside of the eyelids, particularly about the inner canthus; they are soon covered with a thin viscid matter, which, quickly inspissating, fastens them together, and when they are forcibly opened, a large gush of tears succeeds. The eyelids soon swell; the viscid discharge increases in quantity, and speedily assumes a purulent form, whilst the tumefaction of the palpebræ is also augmented. The vascularity of the conjunctiva now becomes extreme, and its minute colourless vessels are so enlarged, and turgid with arterial blood, that the larger branches, which run beneath it, are totally obscured. The surface of this membrane, indeed, is of a beautiful scarlet colour, and resembles that of a fetal stomach, the vessels of which have been filled with fine injection. The swelling of the palpebræ is so great, that, when the child cries, the orbicularis muscle projects the morbid conjunctiva, and, consequently, everts the eyelids; ejecting, at the same time, a considerable quantity of the puriform discharge. The whole cheek on the affected side often swells, and sometimes the mucous membrane of the lachrymal sac and of the nose itself participate in the disorder. Frequently one eye is affected in the beginning; and the other is afterwards attacked. It is not very uncommon for a good deal of bleeding to take place from the eye just before the commencement of suppuration; an event which Beer regards as favourable, as the suppuration is afterwards generally mild, not attended with any destructive effects, and the swelling of the conjunctiva of the eyelid, and also of the conjunctiva of the eyeball itself, if this last tumefaction already exist, soon subsides with great quickness after such hemorrhage. Bleedings of this kind often return two or three times.* As the disease advances, the cornea becomes more or less cloudy. When the affection destroys vision, the cornea is generally penetrated by sloughing or ulceration, and through the opening the aqueous humour escapes, and the iris protrudes. These parts are, at length, followed by the discharge of the crystalline and vitreous humours. Certain authors represent the eye as being sometimes destroyed by suppuration; but Mr. Saunders has positively denied that this is the case.†

By Professor Beer, the causes of the disease are referred to the bad air, in which the affected children often reside, and hence (says he) the complaint is, as it were, endemic in lying-in and foundling hospitals, where from the lochia of the mother, the crowding of many uncleanly people together, foulness of the linen, &c. the atmosphere is quite contaminated.‡ Scarpa adopts the conjecture, that the disease originates from the eyes, and edges of the tarsi, having been exposed at the time of labour to an acrid discharge in the vagina.§ It does not appear to me, that any of these circumstances afford a satisfactory explanation of the origin of the diseases, the exact causes of which, I think, still remain unknown.

The common method of treating this case, is by applying a camphorated lotion, made according to the following formula:

℞ Cupri Sulphatis, Bol. armen. ā ā ℥iv. Camphor. ℥j. M. F. pulvis, Ex quo projice unciam unam in aquæ bullientis ℔iv. remove ab igne et subsideant fœces.

One dram of this remedy is to be mixed with an ounce of cold clear water. The application may be diluted, or strengthened, according to circumstances. The best mode of applying it to the inside of the eyelids is with a syringe, and, in violent cases, this should be done once or twice every hour; for, if the discharge be suffered to accumulate under the eyelids, the worst effects on the cornea and vision may be apprehended. Mr. Saunders disbelieved, that the matter itself was hurtful to the eye, as he had seen ulcers of the cornea heal while the discharge was confined for three days under the eyelids. But the question appears to me to be, not, whether this fortunate event may not sometimes happen, under such circumstances; but, whether it would generally do so? We have also the authority of Beer for stating, that the lodgment of the discharge under the eyelids is attended with hurtful consequences.*

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* Beer, Lehre von den Augenkrankheiten, b. i. p. 313, 314. Wien. 1813.

† See A Treatise on some Pract. Points relating to the Diseases of the Eye, by the late J. C. Saunders, p. 3—6.

‡ Op. cit. b. i. p. 317.

§ Scarpa on the Principal Diseases of the Eyes, transl. by Briggs, p. 158. edit. 2. Lond. 1818.

The late Mr. Ware recommended the eyelids to be covered with a poultice made of the curds of milk, coagulated with alum, and an equal part of unguent. sambuci, or axungia.†

Such has been the ordinary and most approved method of treating the purulent ophthalmy of infants. In the posthumous work of Mr. Saunders, however, the indiscriminate use of stimulant injections is condemned. In the commencement of the inflammation, this gentleman recommends the application of a sufficient number of leeches as near the eye as possible, the bleeding from the bites being suffered to continue a considerable time, so as to produce the effect of general as well as local bleeding. Thus, according to Mr. Saunders, the swelling of the eyelids will soon be reduced. The antiphlogistic plan, having been continued a little while, is to be followed by the use of a mild astringent collyrium. Mr. Saunders, in his own practice, employed a solution of from two to six grains of alum in an ounce of distilled water. This gentleman has particularly enjoined the practitioner to correct the disorder of the bowels, which is apt to accompany the attack of the disease. When the stools are green, magnesia and rhubarb are to be prescribed; and when the child is costive, a grain of calomel is proper.

If a sloughy ulcer of the cornea should form, Mr. Saunders advises us to give the extractum cinchonæ, a few grains of which may be made into very minute pills, and taken every four hours.

When the eversion of the eyelids keeps up a morbid state of the conjunctiva, after the activity of the disease is subdued, compresses must be employed to restore the palpebræ to their right position. In some cases, the eversion is so great, that it becomes necessary to cut out a considerable portion of the diseased conjunctiva. The unguentum hydrarg. nitrat. may be advantageously used for extinguishing the last remains of the disease. *

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* Lehre von den Augenkrankheiten, b. i. p. 522.

† Ware on Fistula Lachrymalis, &c. p. 157—160.

In the early stage, Professor Beer recommends washing away the discharge with Anel's syringe and warm water, care being always taken to wipe the circumference of the orbit perfectly dry afterwards, and then cover it with a camphorated compress. At the commencement of suppuration, he has never seen any good effected by Bates's camphorated lotion; and at that period, he prefers to all other local remedies the simple application of the tincture of opium, which is to be put between the eye and eyelids, once or twice a day, with a camel-hair pencil. He allows, however, that there are a few, but not many cases, in which benefit may be obtained from the employment of a weak mucilaginous collyrium of nitrate of silver. When the discharge afterwards assumes a white thin appearance, he recommends astringents, especially in the form of an eye-salve. †

CONCRETIONS OF THE EYELIDS.

Of this disease, there are two kinds; one, termed *symblepharon*, in which the inner lining of one or both eyelids has become adherent to the eyeball; the other, named *anchyloblepharon*, in which the two eyelids have adhered together at their edges, to a greater or less extent.

This last form of the complaint is sometimes, though rarely, an original malformation. ‡ It is most frequently produced after birth by violent ophthalmies, burns, &c. When the edges of the eyelids have grown together, the preternatural connection is to be divided with a bistoury, taking care not to wound the eyeball. The cut surfaces are then to be kept asunder by the interposition of suitable pieces of lint; until they have healed. When the edges of the eyelids have grown together, from the outer to the inner canthus of the eye, it is of no use to separate them, if the cornea underneath is known to be perfectly opaque.

It is only in cases, in which the adhesions between the eyelids and eyeball are loose, limited to a small extent, and not situated over the cornea, that it is very practicable to do good by dividing them with a knife. Even in such instances, it is frequently very difficult to prevent the adhesions from forming again. The irritation of substances, interposed between the cut surfaces, is generally so great, that the surgeon is obliged to withdraw them. The only plan, which can then be followed, is frequently to introduce a probe between the cut surfaces, make the patient move his eyelids about, and smear the inside of them, every now and then, with a little of the ceratum plumbi superacetatis, by means of a hair pencil.

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* Saunders, op. cit. p. 15. 18, 19, and 20.

† Lehre von den Augenkrankheiten, p. 323.

‡ Beer operated on one case of congenital anchyloblepharon without success. See Lehre von den Augenkrankheiten, b. ii. p. 123.

ECTROPIUM.

This disease for the most part affects the lower eyelid, which becomes turned out towards the cheek, and does not apply itself to the eyeball. * Thus the inner lining of the palpebra is turned outward, and the lower portion of the eyeball is uncovered. The consequence is, that the exposure of the eye and sensible lining of the eyelid induces in these parts a species of chronic inflammation, not only attended with a constant flux of tears and pain, but also with a preternatural redness and thickening of the lining of the affected eyelid. At length, the exposed membrane is converted into an indurated, callous substance, which lies just under the globe of the eye. The disease obstructs the flow of tears towards the inner angle, and through the puncta lachrymalia, and the complaint is always attended with a weeping of the eye.

One of the most common causes of this malady is a contraction of the integuments of the eyelid, or neighbouring part of the face, after the cicatrization of burns, ulcers, and wounds.

Slight cases, arising in this manner, may sometimes be cured, by keeping the eyelid gradually raised more and more every day, with small strips of sticking plaster, which are to be applied to the outside of the affected eyelid, and to the lower part of the forehead. This method, however, is seldom permanently efficacious.

In most instances, it is necessary to remove a considerable portion of the thickened exposed lining of the eyelid, with the aid of a convex bistoury, and a pair of dissecting forceps; and afterwards, in proportion as the wound heals, the eyelid, being properly supported by a compress and bandage, returns to its natural position. In the operation, care must be taken not to cut the puncta lachrymalia. The eyelid is drawn inward again by the same principle which caused its eversion, viz. the contraction of the cicatrix. †

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* Plate V. fig. 4. † Plate V. fig. 5.

There is another species of ectropium mostly met with in old persons, which arises from a relaxation and swelling of the conjunctiva, and from a fungous thickened state of the lining of the everted eyelid. Trivial cases of this sort may be cured by turning the eyelid completely out, and rubbing the argentum nitratum along its fungous surface, until a slough is produced, and afterwards using such remedies as will be recommended in the chapter on ophthalmy, for curing the relaxation of the conjunctiva. The eyelid must be kept everted, until the whole of the caustic has been completely washed off the slough, and the part smeared with oil.

TRICHIASIS. *

In this disease, the eyelashes are turned inward toward the eyeball, which they irritate so much as to produce very serious complaints. Trichiasis is of two descriptions; in the first, there is no defect of the eyelid, and the whole grievance depends entirely on the wrong direction in which the eyelashes grow; in the other, the defect lies altogether in the eyelid itself, the margin of which is preternaturally turned towards the eye, so that the cilia rub against the front of this organ, and cause considerable inconvenience. The latter case, which is by far the most common, is termed *entropium.*

It is observed by Mr. Saunders, that the superior palpebra, when inverted in the slightest degree, is the cause of a most vexatious irritation of the eye; but when a large portion is inverted, the case becomes truly distressing, from the violent ophthalmy which is produced. The friction of the cilia against the eye is incessant, and from the continual suffering, the patient's health and strength decline. The cornea is ulcerated, and becomes opaque, and the sight is ultimately destroyed. Nor is this the end of the patient's misery; except, as occasionally happens, the cornea becomes thickened and indurated in an extraordinary degree, assuming a white appearance, like that of a macerated ligament. If this be the case, the patient finds ease in the insensibility of this new formed substance.

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* Distichiasis, or the case in which superfluous hairs grow against the eye, is considered by Scarpa as not founded in reality; as he asserts, that though two or three rows of ciliæ may appear, their roots are always in one line. But Professor Beer denies the accuracy of this remark, and says, that the case of distichiasis is sometimes met with, hairs actually growing from points of the tarsus, where none are naturally found. See Lehre von den Augenkrankheiten, b. ii. p. 118.

The appearance of the disease in its inveterate form, is truly disagreeable. The discharge, the copious flow of tears, the excoriation of the cheek, the opacity of the cornea, the villous, granular, or fungous conjunctiva, compose altogether a disgusting sight. The patient carries his head obliquely, and attempts, in the most awkward manner, to direct the pupil towards the objects which he wants to see. Indeed, when it is the upper eyelid which is inverted, the patient, in order to evade turning up the eye, distorts the head so as to seem as if he had a wry neck. *

The causes of the distorted position of the cilia are, for the most part, cicatrices, and little indurations on the edges of the eyelids. In consequence of inflammation or ulceration, the hairs have fallen off, and when they grow again, they shoot in a wrong direction. The trichiasis, if not relieved, generally destroys the eyesight, for the friction and pressure of the hairs against the eye occasion severe pain, constant inflammation, and, at length, ulcers, and complete opacities of the cornea.

The cure of the first description of trichiasis consists in plucking out the inverted hairs, and preventing their growing again in the same direction. When many project inward, it is as well to be content with eradicating a few every day, lest the operation should create too much pain and inflammation. The prevention of the hairs from growing again in the same position is frequently very difficult; and, except in young subjects, in whom a frequent repetition of this method of extracting the hairs sometimes leads to a radical cure, Beer states, that the practice is to be considered only as a means of palliation. †

After plucking out the hairs, the most successful plans are to smear the whole inner half of the margin of the eyelid, by means of a fine hair pencil, with the aq. ammon. pur.; or a solution of the argentum nitratum; or else to remove a piece of the skin, containing the roots of the inverted cilia, as proposed by Mr. Saunders.

The second kind of case, called entropium, is the most frequent. In the upper eyelid, the defect is often owing to a relaxed state of the levator muscle; and then it may sometimes

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* See Saunders's Treatise on some Pract. Points relating to Diseases of the Eye, &c. p. 45—48.

Lehre von den Augenkrankheiten, b. ii. p. 121.

be cured by supporting the eyelid for a certain time, with the aid of sticking plaster; but if this plan fails, a cure may almost always be accomplished by cutting away, with the aid of a pair of forceps and scissars, a fold of the integuments near the edge of the tarsus. Care should be taken to do this just in the middle of the inverted part. The wound is then to be closed, as well as circumstances will allow, with sticking plaster, compresses, and a bandage.* In proportion as the contraction of the cicatrix follows, the eyelid will be restored to its right position. This method of treatment seems particularly rational, when the entropium depends on a relaxation of the skin of the eyelid.

With respect to the inversion of the upper eyelid, however, Mr. Saunders believed, that the disease was always owing to a burn, a wound, or inflammation†, and his mode of treatment I shall presently notice.

Dr. Crampton effected a cure in one example, by making two perpendicular incisions in the broad margin of the tarsus, at the sides of the inverted hairs, and then making a transverse cut through the lining of the eyelid, from the extremity of one of the first wounds to that of the other. The inverted portion of cartilage within the incisions was then put into its right position, and retained so with sticking plaster.‡ Of Dr. Crampton's operation for the early stage of the disease, Mr. Saunders has spoken highly, but yet he is of opinion, that, by frequent ophthalmy, attended with ulceration of the conjunctiva, and lastly, of the tarsus itself, such a vicious bending of the latter part is caused, that every attempt at re-establishing its original position is fruitless. Hence, he thinks, that its excision is decidedly indicated, an operation that is followed by no pain nor uneasiness, and that is sure in its effect. No particular shortening of the eyelid ensues; the deformity is vastly lessened; and, unless the cornea has been rendered too opaque, perfect vision is restored.

Mr. Saunders directs a piece of thin horn, or a plate of silver, having a curvature corresponding to that of the eyelid, to be introduced under this part, with its concavity towards the eyeball. On this instrument the eyelid is to be stretched. An incision is to be made through the integuments and orbicularis palpebrarum, down to the tarsus, immediately behind the roots of the cilia. The cut should extend from the punctum lachrymale to the external angle. The exterior surface of the tarsus is then to be dissected, until the orbital margin is exposed, when the conjunctiva is to be cut through directly by the side of the tarsus, which must now be disengaged at each extremity. The punctum lachrymale must be left uninjured. The operation is described as being exceedingly simple, and if any embarrassment arises, it is from the hemorrhage of the ciliary artery, the blood sometimes obscuring the punctum lachrymale just when the operator is about to divide the tarsus by the side of it. No dressings are said to be required, and it is merely necessary to keep the eye covered for a few days. The skin will continue to be elevated just as the perfect eyelid was, and though less completely, sufficiently to leave the pupil clear, when the eye is moderately directed upward. A fungus grew from the wound, in all the cases in which Mr. Saunders operated. He recommends such excrescence to be destroyed with caustic, or the knife.

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* See Scarpa's Osservaz., &c. sulle Principali Malattie degli Occhi, p. 76—78. edit. 8vo.

† Page 49.

‡ See Crampton's Essay on the Entropeon, p. 55.

Respecting this operation, I shall merely observe, that it is more severe than that advised by Scarpa, and must leave more disfigurement. Unless, therefore, the latter method prove ineffectual, I see no reason for abandoning it.

Inversion of the lower eyelid is much less common, than that of the upper. The late Mr. Saunders never saw this disease arise from the same causes, which induce it in the upper palpebra, though he acknowledges the possibility of such a case. However, he met with several instances of the affection, in consequence of encysted tumours, which, as they increased, carried the orbital edge of the tarsus outwards, and in the same proportion inclined the ciliary edge towards the globe of the eye.

An inversion of the inferior palpebra is sometimes produced by inflammation and swelling of that part of the conjunctiva which connects the eyelid with the eyeball. In cases of ophthalmy, it often forms between the latter parts a distinct fold, which is situated just on the inside of the orbital edge of the tarsus, and pushes it outward; while the contraction of the orbicularis muscle turns inward the ciliary edge, and inclines it between the projecting tumefied conjunctiva and the eye. In an early stage, replacing the eyelid, and maintaining it so, until the ophthalmy has been lessened by proper means, will be found effectual. But, when the conjunctiva has become much thickened and indurated, Mr. Saunders recommends cutting this part of it away, and applying compresses to keep inward the orbital edge of the tarsus.*

PTOSIS.

This disease consists in an inability of properly raising the upper eyelid. Of this three varieties are noticed: the first depends on a preternatural elongation of the skin of the upper eyelid; the second, on a weakness or total paralysis of the levator muscle; and the third, on a spasmodic contraction of the orbicularis palpebrarum.

The first example is the most frequent, and is cured by the removal of the redundant integuments of the eyelid.

The second species is principally met with in old persons, in whom the cure is often impracticable. This sort of ptosis sometimes seems to be symptomatic of other affections, chlorosis, irritation in the stomach and bowels, worms, &c., while in other examples it is entirely a local defect.

The chief means of cure are, the external use of the tincture of cantharides and cold water; the shower bath; the internal exhibition of bark; the use of camphorated liniments; electricity. This ptosis is frequently periodical.

The third species of ptosis arises from a spasmodic affection of the orbicularis muscle, and is the most uncommon. The affection is never continual, but makes its attacks at certain or uncertain periods, and its duration varies in different cases.

The spasmodic ptosis usually depends on some sympathetic irritation in the system. The removal of this particular irritation, whatever it may be; the internal exhibition of antispasmodics; applying a blister to the temple, and bathing the eye with warm milk containing saffron, or with a decoction of poppy-heads or cicuta; form the usual method of the treatment.

LAGOPHTHALMUS. — HARE-EYE.

This is a complaint, in which the eyelids cannot be shut, nor the eye covered. The inconveniences resulting from the disease are of various kinds. The eyes weep constantly, because the interruption of the alternate closure and opening of the eyelids hinders the tears from passing into the nose: the patient becomes blind in a very light situation, in consequence of his not being able to diminish the rays of light which fall on the eye; and, on the same account, the sight becomes gradually very much weakened; the patient cannot sleep in a chamber into which any light enters; and the extraneous substances in the atmosphere settling on the eyeball, cannot be washed away by the action of the eyelids, so that they occasion irritation, pain, and redness.

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* See Saunders's Treatise on some Pract. Points relating to Diseases of the Eye, &c. chap. 3.

The cause of this complaint sometimes depends on a swelling or protrusion of the eyeball out of the orbit. But the defect commonly lies in the upper eyelid. Sometimes, though very seldom, it originates from a paralytic affection of the orbicularis muscle. This case requires the same kind of treatment as the second species of ptosis.

Lagophthalmus most frequently arises from a contraction of the skin of the upper eyelid, in consequence of wounds, abscesses, burns, &c. This case is to be treated on the same principles as the ectropium.

Until the complaint is permanently cured, the eye should be protected by a shade from exposure to a strong light.

HORDEOLUM, OR STYE.

The tumours of the eyelids are of various kinds. The stye is always situated at the edge of the eyelids. It is a very small circumscribed tumour, about the size of a barleycorn. An inflamed stye is commonly extremely red and painful; and is very similar, in every respect, to a small boil, or an inflamed encysted tumour.

. The cure of the inflamed stye demands the external employment of emollient applications; for, the tumour always suppurates, and the more this is promoted, the sooner is the patient freed from inconvenience. Even when the stye has already suppurated, emollients are the best applications, until the hardness has subsided. When the suppuration has terminated, a weak solution of the acetite of lead may be used to disperse the remaining redness and swelling.

The *indurated* stye, as it is called, occasions a good deal of inconvenience, by frequently inflaming and becoming painful, hindering the motion of the eyelids, and preventing the free enjoyment of sight. The best mode of curing this disease is to touch the little induration with the argentum nitratum until it is destroyed.

ENCYSTED TUMOURS OF THE EYELIDS.

These are most frequently situated immediately under the skin, but sometimes they lie so deeply, that they can be taken out more easily from the inside than the outside of the part. They seldom become very large, and are more commonly observed on the upper, than the lower eyelid. When they have attained a certain size, they hinder the elevation of the eyelid, and occasion the infirmity called ptosis.

The attempt to disperse encysted tumours of the eyelids generally fails, and as the operation of removing them with a knife is by no means serious, it is almost absurd to tamper with the complaint. Scarpa is a strong advocate for removing the generality of these tumours, by making the incision through the lining of the eyelid. One would conceive, that, if the tumour were on the outside of the cartilage of the eyelid, the operation must be most easy when the wound is made through the integuments of the part.

CHAP. XI.

OPHTHALMY.

OF all the disorders of the eyes, inflammation is the most frequent, and there are few other diseases of these organs on which it is not attendant. Of many, it is a necessary symptom or consequence. Pain and redness are its chief diagnostic symptoms, the latter one is particularly so, the healthy eye being free from all redness. But this appearance is not essential to the complaint; for, in some cases of internal ophthalmy, the eye may be a good deal affected, and yet little or not at all red. The red appearance, when present, is most evident in the white of the eye; but when the inflammation is considerable, red vessels are frequently seen ramifying over the cornea. The dark red swelling of the conjunctiva, termed *chemosis*, which is seen in severe examples, arises from an effusion of blood into the loose cellular texture, which connects this membrane with the sclerotica. The eyelids also commonly partake of the redness attendant on the disorder.

In mild cases, the pain may be compared with a sense of heat in the part affected, or with a sensation seeming to arise from the lodgment of sand or dust underneath the eyelids. In more severe instances, there is a violent, burning, spasmodic, darting pain in the eye. When the patient feels as if the orbit were too small for the eyeball, and he experiences a darting pain in the eyebrow, sometimes shooting as far as the occiput, we may infer, that the ophthalmy is of a violent kind, and that there is danger of suppuration.

The exposure of an inflamed eye to the light is productive of considerable pain, attended with a copious discharge of tears; consequently, patients affected with ophthalmy are generally observed with their eyes more or less closed.

Ophthalmy is sometimes attended with a diminution, or total loss of vision, and this unpleasant event may depend on opacity of the cornea, a closure of the pupil, or a paralytic state of the retina.

Tumefaction, which accompanies inflammation in general, seems, in these cases, principally to affect the conjunctiva forming the white of the eye. In violent ophthalmies, this membrane swells in such a manner, that it covers the whole cornea, protruding like a thick fold between the eyelids, which cannot be shut. The whole eyeball seems, on this occasion, like a portion of red flesh. The cornea is also liable to become considerably thickened, so as to come into contact with the iris, and adhere to it, or to form an opaque prominence, forward, termed *staphyloma*.

In ophthalmy, the eyelids are frequently very much swollen. Acute inflammations of the eyes are usually accompanied with the common symptoms of inflammatory fever, the constitutional disturbance being proportioned to the vehemence of the local affection, and the irritability of the patient.

In severe ophthalmy, two distinct stages are in general observable; the first is attended with a great deal of heat and pain in the eye, and considerable febrile disorder; the second is comparatively a chronic affection, without pain and fever. The eye is merely weakened, moister than in the healthy state, and more or less red. The second stage is frequently very obstinate, and much more difficult to cure than the first.

CAUSES.

Ophthalmy may be the consequence of the generality of such exciting causes as operate in producing inflammation in other situations. A severe cold, in which the eyes are affected, at the same time, with the pituitary cavities, fauces, and trachea; change of weather; sudden transitions from heat to cold; the prevalence of cold winds; residing in damp or sandy countries in the hot season; exposure of the eyes to the vivid rays of the sun, are causes usually enumerated, and considering which, it does not seem extraordinary that ophthalmy should often make its appearance as an epidemic, and afflict persons of every age and sex. To these causes, the continental surgeons add worms, sordes of the primæ viæ, dentition, the suppression of habitual discharges, &c. Lastly, we have to mention the common idea, that ophthalmy may arise from specific disease, as syphilis, scrophula, or be propagated by infection, as is thought to happen in some species of purulent ophthalmy.

TREATMENT OF ACUTE OPHTHALMY.

In general, mild cases are easily cured by means of low diet and gentle purging, with small repeated doses of the antim. tart. Scarpa recommends the following formula:

℞ Antim. tart. gr. j. Decocti hordei ℔iss. Crystall. tart. ʒj. Sacchari pur. ʒij.—M.

This mixture is to be taken every day in convenient doses. After searching for any extraneous body, that may have insinuated itself beneath the eyelids, the eye may be repeatedly washed with warm milk put into an eye-cup, and the affected organ may afterwards be covered with a very soft bread and milk poultice, included in a little bag of fine muslin.

Under this treatment, the acute stage of the ophthalmy commonly ceases in four or five days. The patient no longer complains of that oppressive sense of heat, weight, tension, and throbbing, experienced at first, and bears a moderate light, without a profuse evacuation of tears from the affected eye.

At this period, though the conjunctiva may appear red, it is no longer affected with acute inflammation; and the ophthalmy has relapsed, from its inflammatory stage, into one comparatively chronic, attended with weakness and relaxation of the vessels of the conjunctiva, and membranous lining of the eyelids. Emollients are now improper, and astringent and corroborant collyria are indicated.

℞ Zinci Sulphatis gr. v. Aq. rosæ ℥iv. M. Vel, Cerussæ acet. gr. viij. Aq. fœniculi ℥vj. Spir. vin. camph. gtt. x. — M.

One of these lotions should be applied to the eye, four or five times a day, by means of an eye-cup.

The severe acute ophthalmy, and that which is attended with chemosis, require the antiphlogistic treatment in the most rigorous degree. Both general and topical blood-letting should be speedily put in practice; and nauseating doses of tartarised antimony freely exhibited; a practice which is more effectual, than any other known means, in suddenly checking the process of acute inflammation in the eye. Leeches should be applied to the vicinity of the eyelids, or, what is still better, blood should be taken from the temporal artery. When the chemosis is very considerable, the distension of the conjunctiva may be relieved, by making an incision into this membrane, near its junction with the cornea.

When bleeding and evacuations have been put in practice, the next most useful measure is to apply a blister to the temple, or nape of the neck.

At first, emollient applications are the most beneficial, such as a bread and milk poultice, or the soft pulp of a baked apple, included in a little bag made of fine muslin or gauze. Remedies of this description should be renewed, at least, once every two hours. When the ophthalmy is accompanied with insupportable pain in the head, a strong decoction of poppy heads may be used as a fomentation. In order to prevent the eyelids from adhering together in the night-time, their edges are to be smeared with the spermaceti ointment.

Under the preceding treatment, the acute stage of violent ophthalmy commonly ceases in about a week. The burning heat, and darting pains in the eyes; the fever; and the tension of the eyelids, subside; while a discharge of thick matter succeeds a secretion of thin serum, or a preternaturally dry state of these organs. A moderate light can now be borne without vast irritation; and notwithstanding the eyes may continue red, and the conjunctiva swelled, evacuations and emollient applications are to be discontinued. One of the above-mentioned collyria is to be employed; and such patients, as cannot bear the application cold, are to be permitted to use it warm. In proportion as the irritability diminishes, the warmth of the collyrium should be gradually lessened, until the application can be borne quite cold.

The *tinctura thebaica*, or *vinum opii*, first tried and recommended by the late Mr. Ware[*], proves a most efficacious remedy for ophthalmy, connected with local vascular weakness. Two or three drops may be insinuated between the eyelids and eyeball twice a day. In some instances, however, once in the evening will be sufficient. The application, at first, excites severe pain, and a copious flux of tears; but these symptoms soon go off, and leave the eye in a very improved state. When this remedy proves unsuccessful, it is usually when it has been employed prematurely, while great irritability and aversion to light exist.

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[*] See Remarks on Ophthalmy, &c. p. 46. et seq. edit. 3.

Whenever the patient can easily bear a moderate degree of light, all coverings should be removed from the eye, except a shade of green silk. A brighter light should every day be admitted into his chamber, so that he may become habituated to the open day-light as soon as possible. Nothing has a greater tendency to maintain and augment the morbid irritability of the eyes, than keeping them unnecessarily long in a dark situation, or covered with compresses and bandages.

In certain stages of acute ophthalmy, a proposal has been made to puncture the cornea, and let out the aqueous humour. In the living body, the transparency of the cornea varies according to the degree of its distension, and in cases of opacity of the cornea, attended with fulness of the eyeball, the transparency of the above membrane may be restored by the evacuation of the aqueous humour. Mr. Wardrop first tried the experiment in a case, in which there was a considerable degree of milkiness and opacity of the cornea, and in which the eyeball appeared distended and prominent, attended with acute inflammatory symptoms. He discharged the aqueous humour by a small incision, and found, that the operation produced, not only an alteration in the degree of the transparency of the cornea, but an abatement of the pain, and a sudden check of all the inflammatory symptoms. Hence, he was afterwards led to perform the operation for the purpose of relieving the ophthalmy, as well as preventing opacity of the cornea, when the inflammation was attended with a fulness, prominence, and sense of distension in the eye, and cloudiness of the cornea. He says, also, that in all cases, in which there is the smallest quantity of pus in the anterior chamber, accompanied with inflammation, he would discharge the aqueous humour.

Mr. Wardrop recommends the operation to be done with the same kind of knife that is employed for the extraction of the cataract. The instrument is to be introduced into the cornea, at the place where the knife is usually introduced in operating for the extraction of the cataract, so as to make an incision as broad as the blade. The aqueous humour will then flow out along the edges of the blade, as soon as this is turned a little on its own axis.*

PURULENT OPHTHALMY IN ADULT SUBJECTS.

The purulent eyes of infants were noticed in the preceding chapter: there is another kind of purulent ophthalmy to which adults are subject, and which is so generally represented by the best modern authors as arising from two very peculiar causes, viz. the suppression of a gonorrhœa, and the inadvertent application of gonorrhœal matter to the eyes, that the mention of the case cannot be prudently omitted.

The disease produces rather a swelling of the conjunctiva, than of the eyelids. This tumefaction is followed by a discharge of a yellow, greenish matter, similar to what issues from the urethra in cases of clap. Heat, and pain in the eyes; great aversion to light; and, in some instances, an appearance of hypopium in the anterior chamber; are the symptoms of the disorder. When the complaint proceeds from the second cause, it is said to be less severe.

TREATMENT.

With respect to the case alleged to originate from the suppression of a discharge from the urethra, the injection of warm oil, the introduction of a bougie into the passage, and the application of poultices to the perineum, with a view of renewing the discharge, form the outline of the practice of such surgeons, as place implicit reliance in the reality of the above-mentioned cause. However, the rarity of the complaint, upon the sudden stoppage of a gonorrhœa; the possibility of an ophthalmy arising as well at this as at any other period, and quite independently of the urethral affection; and the fallacious nature of any inference, deduced from the supposed resemblance of the discharge from the eyes to that from the urethra, cannot fail to raise, in a discerning mind, a degree of doubt, concerning the assigned cause. But, should the fact be indisputably established, it would show an inexplicable sympathy between the urethra and organs of vision; but not any metastasis.†

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* Wardrop in Edinb. Med. and Surg. Journal, vol. iii. p. 56.

† I am happy to see, that Professor Scarpa, in his 5th edition, renounces the idea, that ophthalmy arises from the suppression of gonorrhœa.

The treatment of purulent ophthalmies, from whatever cause they may arise, in adult subjects, consists, at first, in adopting antiphlogistic means, exhibiting nauseating doses of tartarized antimony, applying emollient remedies to the eyes, and a blister to the temple, or nape of the neck. The eyes may be frequently fomented with a decoction of white poppy heads, and warm milk may be repeatedly injected beneath the eyelids; and in order to prevent these parts from adhering together, the spermaceti cerate may be smeared every night, at bed-time, upon the edges of the tarsi.

But when the heat, and pain in the eyes, and febrile symptoms have diminished; and an abundant discharge of pus has commenced; all topical emollient applications are to be immediately relinquished, and the following collyrium employed.

℞ Aq. rosæ ℥x. Hydrarg. mur. gr. j. — M.

Scarpa affirms, that in the ophthalmy, originating from the inadvertent communication of gonorrhœal matter to the eyes *, applications in the form of ointment, such as Janin's ophthalmic ointment, or the ung. hydrarg. nitrat., are more efficacious than fluid remedies.

Besides these purulent ophthalmies, and that of infants, there is another very similar disorder of the eyes, which attacks persons of every age, and spreads by contagion. Of this nature was that malignant inflammation of the eyes which diffused itself amongst the English and French troops in Egypt. It is not uncommonly supposed, that the disease was conveyed from one individual to another by the incautious application of the specific virus to the conjunctiva. The symptoms were a copious purulent discharge from the eyes, tumefaction of the eyelids, conjunctiva, and eyeball, and a rapid tendency to opacity and ulceration of the cornea. The treatment, commonly recommended for this case by writers, resembles that of other purulent ophthalmies. On the commencement of the attack rigorous antiphlogistic measures, with nauseating doses of tartarised antimony, are proper, followed by the frequent use of astringent injections between the eyelids and eyeball. According to Mr. Briggs, as soon as the acute stage has ceased, the most successful practice consists in intro-

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* Scarpa still believes in the reality of the cause here specified; but I have always doubted the accuracy of the opinion; and during an extensive experience of five-and-twenty years, Mr. Pearson has never seen a single instance, in which an inflammation of the eyes was evidently derived from a gonorrhœa. See a note by Mr. Briggs in his Transl. of Scarpa on the Eyes, edit. 2. p. 165.

ducing a minute quantity of the oleum terebinthinæ with a camel-hair pencil, between the eye and eyelids every morning. *

CHRONIC OPHTHALMY.

We have seen, from the foregoing account, that every acute ophthalmy has a second stage, which is, when compared with the first, of a chronic nature. However, when we speak of *chronic ophthalmy*, we generally mean the disease as it appears in a very protracted state.

CAUSES.

The general causes of chronic ophthalmy are of three kinds. 1. An increased irritability continuing in the eye after acute ophthalmy. 2. Another affection of the eye and adjoining parts, of which the chronic ophthalmy is only an effect. 3. Constitutional disease.

1. The first kind of case requires the internal exhibition of bark and valerian. The patient should take nourishing, easily digestible food; a moderate quantity of wine, and gentle exercise; and he should reside in a mild and salubrious situation. The vapour of the spirit. ammon. comp. (L. P.) should be applied to the eye through a funnel for half an hour, three or four times a day, and the eyelids and eyebrow rubbed with the linimentum camphoræ.

2. The disorders in the eye and its vicinity, on which chronic ophthalmy depends, as an effect, are not subjects for consideration in the present chapter.

SCROFULOUS OPHTHALMY.

According to Mr. Saunders, pustules of the conjunctiva, aggregated at the margin of the cornea, or appearing separately, or successively over any part of its surface, constitute a specific character of strumous ophthalmy, with which the morbid appearances, peculiar to a scrofulous constitution, are more or less connected. In large cities, the causes are stated to be an impure atmosphere, improper food, and cold. †

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* Transl. of Scarpa on the Eyes, edit. 2. p. 170. Scarpa, P. M'Gregor, Omodei, (Cenni sull' Ottalmia d'Egitto,) and most other surgeons, adopt the opinion, that the Egyptian ophthalmy was contagious. But M. Roux (Parallèle de la Chir. Angl. &c.) and Professor Assalini (Manuale di Chirurgia) incline to the opposite sentiment.

† P. 99.

No specific for scrofula being known, the treatment consists rather in preventing an aggravation, than attempting the radical cure of the complaint. Every thing debilitating is injurious; as evacuations, indigestible food, intense study, a sedentary life, damp marshy residences, lowness of spirits, frequent transitions from heat to cold. On the other hand, keeping the bowels regular with small doses of potassæ tartras; antim. tart; or rhubarb; and the exhibition of bark, to which may be occasionally added the tinct. guaïaci ammon.. are particularly useful. The Æthiops mineralis may be advantageously given from gr. ss. to gr. xx. every day for three weeks. Scarpa also recommends the aq. calcis to be taken in broth for several months. Sea-bathing and friction of the body with a flesh-brush are also beneficial.

With regard to topical remedies, soft relaxing applications prove hurtful; but slightly astringent collyria, the tinct. thebaica and the ung. tutiæ, do good. All coverings must be removed from the eyes, except a shade of green silk.

Scrofula often disappears spontaneously, as children approach the adult state, and, with it, this affection of the eyes.

Upon the treatment of scrofulous ophthalmy, I find nothing very remarkable in Mr. Saunders's publication. Mild cases are said to yield to a purer atmosphere, and a few doses of submuriate of mercury, and rhubarb; but too frequent a repetition of the latter medicine is condemned. When the inflammation is not acute, and the ulcers are indisposed to heal, we are advised to inject on them a solution of nitrate of silver, two grains to an ounce of distilled water. But when more lymph is effused round the ulcer than is necessary for the healing process, general or topical bleeding, and more frequent purging, are sanctioned. In this state, every stimulant application is forbidden, and we are recommended to employ either a very weak saturine lotion, cold; or else a warm decoction of poppies. *

CHRONIC OPHTHALMY SUCCEEDING THE SMALL POX.

This species is described as peculiarly obstinate. Setons in the nape of the neck are among the best remedies. Scarpa recommends either the following powders, or pill, for a child ten years old:

℞ Crem. tart. ʒss. Antim. tart. gr. j.—M.

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* P. 100, 101.

This quantity is to be divided into six parts, one of which is to be taken every morning and evening.

℞ Hydrarg. Submuriatis gr. j. Sulph. aur. antim. gr. j. Pulv. cicut. gr. iv. ft. pil.

When great irritability prevails, Scarpa recommends a mixture of ʒiii of vinum antim., and ʒj of the tinct. theb. to be given in doses of five or six drops, in any convenient vehicle, and aromatic spirituous vapours to be externally applied to the eye. In other cases, saturnine collyria, containing a little camphorated spirit; tinct. theb.; Janin's ophthalmic ointment, &c.

VENEREAL OPHTHALMY.

In no subject do surgical writers betray less consistency, than in the present. Many have doubted the reality of syphilitic ophthalmy; others have admitted its occurrence, but left it undescribed. Scarpa says it is peculiar in not betraying manifest signs of inflammation, stealing on clandestinely, without much uneasiness. It afterwards relaxes the vessels of the conjunctiva, and lining of the eyelids, and alters the secretion of Meibomius's glands. Ulceration of the margin of the eyelids is caused, the eye-lashes fall off, and the cornea becomes opaque. In the worst stage, the malady excites an itching in the eyes, that is exasperated at night, and diminishes towards the morning.

It is observed by Mr. Pearson, that, in that form of the secondary symptoms of syphilis, where the skin is the part chiefly affected, a disease resembling the ophthalmia tarsi sometimes appears. It is not commonly attended with much redness of the tunica conjunctiva; nor is the sensibility of the eye to light remarkably increased: yet this gentleman has seen it, in a few instances, in the form of an acute ophthalmia, resisting all the common modes of treatment, but yielding immediately to a course of mercury.

The venereal ophthalmy (says Mr. Pearson) resembles, in its appearance, those diseases of the tarsi and conjunctiva which are derived from scrofula; and in his belief, there are no specific characters, by which diseases of the eye, or eyelids, produced by the action of the venereal virus, can be distinguished from those which are excited by other causes. *

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* See a note, p. 165. of the Transl. of Scarpa on the Eyes, by J. Briggs. 2d edit.

In the posthumous work of Mr. Saunders, syphilitic inflammation of the iris is stated to differ from common inflammation of that part in the following circumstances: the iris is much more thickened and puckered, the texture appears more changed, the irritation on exposure to light is less, the pain is most intense at night, and red vessels are sooner seen in the substance of the iris. The pupil is not so much contracted as in a case of simple inflammation; and, although the general appearance of disease is greater, the pain is actually less. The blindness is often total. When syphilis affects the other tunics of the eye, as well as the iris, the eyeball is said to appear full, the patient is slightly incommoded by pressure on the organ, and the sensibility of the retina is impaired, and in some instances destroyed. In the worst stage, the pupil is represented as becoming irregular, and dilated; while the iris and cornea are in contact, and much diminished and obscured; the sclerotica is tumid and uneven on its surface; and much headach prevails. *

Mercurial frictions, together with the decoct. sarsap. and mezer., are recommended. A few drops of a collyrium, containing the hydrarg. mur. are also directed to be instilled under the eyelids every two hours. At night, the palpebræ may be smeared with Janin's ointment, or the ung. hydrarg. nitrat. Mr. Saunders cured certain ophthalmies which he considered as syphilitic, by exhibiting calomel very freely. In one case, he gave eight grains a day for a fortnight; and in another, two grains were ordered to be taken every five hours, with half a grain of opium. He also sometimes took blood from the temporal arteries. †

Violent inflammations of the eyes may terminate in a general suppuration of those organs, and render the restoration of sight totally impracticable.

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* See Saunders's Treatise on some Practical Points relating to Diseases of the Eye, &c., p. 64. 67., and pl. 1. fig. 2 and 3., with the explanation.

† The existence of syphilitic ophthalmy appears to me very questionable; nor have I ever seen an inflammation of the iris which could be positively set down as originating from syphilis. To the subject of iritis, however, we shall presently return.

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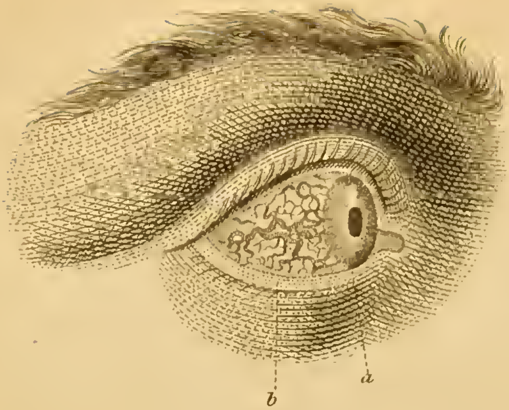

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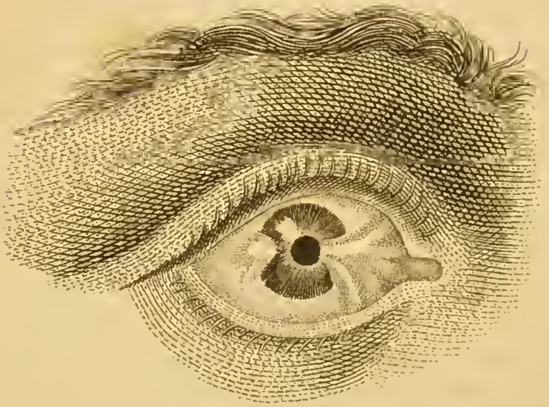

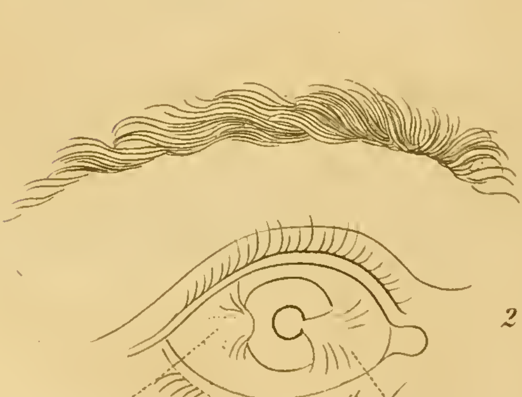

CHAP. XII.

OPACITIES OF THE CORNEA.

OPACITY of the cornea is one of the worst consequences of obstinate chronic ophthalmy. Scarpa distinguishes the superficial, and recent state of the disease, from the albugo and leucoma, which are usually accompained with inflammation, assume a clear pearl colour, and affect the very substance of the cornea.

The nebula, or slight opacity, now to be considered, is preceded by, and attended with chronic ophthalmy. The iris and pupil can be seen through a kind of dimness; and of course the patient is not entirely bereft of vision. The veins of the conjunctiva, greatly relaxed by the protracted duration of chronic ophthalmy, become preternaturally turgid, irregular, and knotty; first in their trunks; then, in their ramifications, near the union of the cornea with the sclerotica *; and, ultimately, in their most minute branches, returning from the delicate lamina of the conjunctiva, spread over the anterior surface of the cornea. When this happens, a milky albuminous secretion begins to be superficially effused in the interspaces between the red streaks. The opaque specks, thus produced, may cover only a part, or the whole, of the cornea.

The opacity of the cornea, sometimes occurring in violent ophthalmies, is essentially different from the nebula, and arises from a deep extravasation of coagulating lymph in the cellular texture of the cornea, or from an abscess between the layers of this membrane.

Very active measures ought to be taken in the incipient state of the disease; for, though it may at first only occupy a small portion of the cornea, if left to itself, it will continue to extend towards the centre of this membrane; and as the veins become more and more varicose, it will convert the delicate layer of the conjunctiva, spread over the surface of the cornea, into a dense, opaque film.

The curative indications are, to make the varicose vessels recover their natural diameters; and, if that be impracticable, to cut off all communication between the trunks of the most

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* See Plate VI. fig. 1. A, the nebula; B, dilated vessels.

prominent varicose veins of the conjunctiva, and those on the cornea. The first plan is executed by using Janin's ointment, or the ung. hydrarg. nitrat., together with astringent collyria. The second is accomplished by the excision of the fasciculus of varicose veins, just at the base of the opacity; and the most convenient instruments are a very sharp pair of dissecting scissars and the common anatomical forceps.

ALBUGO AND LEUCOMA.

These are effects of severe acute ophthalmy, and consist of an extravasation of dense lymph in the very substance of the cornea. The disease is sometimes the consequence of an ulcer, or wound of this membrane. The first species, arising from the extravasation of lymph, is named albugo; while the term leucoma is particularly applied to the other form of the complaint.

The recent albugo may sometimes be dispersed by the same treatment, as is applicable to violent ophthalmy, viz. at first, general and topical bleedings, internal antiphlogistic remedies, and topical emollients; in the second stage, astringent, and moderately stimulating, topical applications. However, all our efforts are unavailing, when the action of the absorbents in the part has been, as it were, deadened, and the texture of the cornea disorganized. In recent cases, as soon as the inflammation of the eye has been subdued, there is no better remedy for promoting the absorption of the extravasated opaque matter than the unguent. hydrarg. nitr., accurately applied to the seat of the opacity, by means of a hair-pencil. The eye may also be frequently washed with the following collyrium, mentioned in Scarpa's excellent book, on the diseases of the eyes: two scruples of muriate of ammonia, four grains of verdigrease, dissolved in eight ounces of lime water: the mixture is to stand twenty-four hours, and is then to be filtered. The treatment should be continued for three or four months, before the case is abandoned as incurable.

In the true leucoma, arising from a cicatrix, nothing known has the power of restoring the transparent state of the cornea.

CHAP. XIII.

ULCERS OF THE CORNEA.

AN ulcer of the cornea is commonly the consequence of the rupture of a small abscess, which not unfrequently forms beneath the delicate layer of the conjunctiva, continued over the cornea, or in the very substance of the cornea itself, in consequence of violent ophthalmy. At other times, the ulcer is produced by the irritation of extraneous substances in contact with the eye, such as quick-lime, pieces of glass, &c.

Little abscesses of the cornea ought never to be punctured, although they are slow in bursting. The matter, which they contain, is so viscid, that not a particle of it ever issues from an opening, and the wound exasperates the disease, increases the danger of the opacity of the cornea, and often occasions another small abscess in the vicinity of that which has been punctured. The safest plan is to temporise, until the pustule spontaneously bursts; promoting this event, by means of frequent fomentations, by bathing the eye with warm milk and water, and by applying to it emollient poultices.

The ulcer of the cornea is of a pale ash-colour; its edges are high and irregular; it creates acute pain, discharges a serous matter, and has a tendency to spread widely and deeply. Scarpa has observed, that this character is not peculiar to ulcers of the cornea, it is common to all those sores which are situated where the skin is delicate, tense, and exquisitely sensible; as on the nipples of the mammæ, the glans penis, lips, apex of the tongue, &c.

When ulcers of the cornea spread superficially, the transparency of the membrane becomes destroyed; when they proceed deeply, and penetrate the anterior chamber of the aqueous humour, this fluid escapes, and a fistulous opening may remain, or a prolapsus of a portion of the iris take place. If the ulcer is large, even the crystalline lens and vitreous humour may fall out; and in short, a total destruction of the whole organ of sight be the result. The cicatrix of a large ulcer impairs the texture of the cornea so much, that the injury is irremediable.

TREATMENT OF ULCERS OF THE CORNEA.

In order to determine what plan of cure should be followed, it is highly important to know, that although the ulcer is first caused by ophthalmy, this is afterwards, in its turn, kept up by the ulcer, and not the ulcer by the inflammation.

Just when the ulcer is making its appearance, while the inflammation is very violent, no doubt, the first indication is to lessen the latter, before attempting to heal the former; but, after this first stage, the grand object to be immediately attempted, is to destroy the extreme sensibility and irritability of the ulcer. In proportion as this intention is fulfilled, the ophthalmy gradually vanishes, or at most, only requires the use of an astringent collyrium.

The best plan is to take a piece of the argentum nitratum, scraped to a point, like a pencil, and to apply it accurately to the ulcerated surface of the cornea, until an eschar is formed. The eye is to be immediately afterwards bathed with warm milk. At the instant, when the caustic is applied, the patient complains of a most acute pain; but he is amply compensated for this temporary suffering, by the comfort experienced, a very few minutes after the operation.

The production of ease, in so sudden a manner, is entirely owing to the destruction of the irritable surface of the ulcer, and to the eschar, which shields the part affected from the contact of the neighbouring surfaces; but the relief only lasts until the slough is detached. On the recurrence of burning pain at the ulcerated part, and of restraint in moving the eye and eyelids, the surgeon, without delay, is to renew the application of the argentum nitratum, taking care to make as good an eschar as before, over the whole surface of the sore. The same benefit, experienced from the previous operation, will be experienced again. In this manner, the caustic is to be used as often as it may be necessary. At every separation of the eschar, the diseased sensibility of the eye, and the extent and depth of the ulcer, will be found more and more diminished. The sore also loses its ash-colour, and assumes a pink hue: a certain mark of its disposition to heal. We must now abandon the use of the caustic, and be content with employing the vitriolic collyrium. Towards the end of the case, if relaxation of the cornea should continue, Janin's ointment may be serviceable.

Slight excoriations of the cornea, being mere separations of the layer of the conjunctiva, naturally spread over that membrane, do not require the use of caustic: for them the vitriolic collyrium is quite sufficient.

Sometimes, as Scarpa accurately describes, the ulcer of the cornea, being already very extensive, and wrongly treated, assumes the form of a fungous excrescence, which seems to derive its support from a plexus of blood-vessels in the conjunctiva. This sort of ulcer, left to itself, or treated with slight astringents, produces, in general, a loss of sight. The most vigorous measures are indicated. These consist in cutting away the fungus with a pair of small scissars, to a level with the cornea, and continuing the incision far enough on the conjunctiva to remove, with the excrescence, the net-work of vessels, from which it was supplied with blood. Having accomplished this, and allowed the blood to flow freely, the argentum nitratum is to be applied to all that surface of the cornea which appears to have been the seat of the fungus. The application of caustic must be repeated, until the ulcerative changes into the healing process.

CHAP. XIV.

OF THE PTERYGIUM AND ENCANTHIS.

1. PTERYGIUM.

THIS term is applied to a little, preternatural, reddish, ash-coloured, triangular membrane, usually growing from the internal angle of the eye, about the caruncula lachrymalis, and extending over the cornea to the great impairment of vision. Although this kind of membrane generally proceeds from the inner canthus, it occasionally arises from the outer one, and in some instances from the superior and inferior hemisphere of the eye itself. Wheresoever it originates, it is a remarkable fact, that it is invariably of a triangular shape, the base of the triangle being towards the white of the eye, the apex towards the cornea, sometimes at a greater, sometimes at a lesser distance, from the axis of sight. In a few uncommon cases, two * or three pterygia, of various sizes, are met with in the same eye, arranged with different interspaces around the circumference of the organ. Sometimes, their

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* Plate VI. fig. 2. Two pterygia, of different sizes, on the same eye. A, the larger one, next the nose; B, the smaller one, next the temple. The straight and semicircular lines on the pterygium, A, denote the double direction, which ought to be given to the incision, in extirpating the malady.

points meet, and coalesce on the centre of the cornea, so as completely to abolish the functions of the eye.

Scarpa observes, with his usual accuracy, that between chronic varicose ophthalmy with relaxation of the conjunctiva, the superficial opacity, termed nebula, and the pterygium, the only difference is in the degree of the disease. All three consist of a varicose state of the vessels of the conjunctiva, over a certain extent of this membrane, together with a degree of relaxation of the tunic itself. In the chronic varicose ophthalmy, the preternatural magnitude, and knottiness of the veins, and the relaxation of the conjunctiva, are confined to the white of the eye; in the nebula, the vessels of the conjunctiva are dilated and knotty, even over some part of the delicate layer of this membrane, covering the transparent portion of the eye: in the pterygium, to the varicose state of the vessels on the surface of the cornea, is added a thickening of the lamina of the conjunctiva, spread over this membrane.

A very peculiar feature of the pterygium is the facility with which it may be taken hold of with a pair of forceps, and raised in a fold over the cornea. It is worthy of notice, however, that sometimes the pterygium assumes a malignant cancerous nature, and then it has a bright red colour, like sealing-wax, easily bleeds when touched, is firmly adherent to the cornea, and occasions lancinating pains, which extend over the whole eye and temple. Scarpa recommends this case to be treated on the palliative plan; but it seems questionable, whether it might not be proper to attempt the total excision of the disease; if the trial should fail, we might then extirpate the eye; an operation truly horrible; but one which would certainly become inevitable, if the malignant pterygium were allowed to increase, and one which can be avoided by no other means, than an effort to extirpate the recent disease.

The cure is performed by accurately cutting away the opaque triangular membrane from the surface of the cornea. As the pterygium itself is the delicate layer of the conjunctiva, forming the natural covering of the cornea, a cicatrix, and a degree of dimness, necessarily remain after the operation. The opacity, however, is always of much less extent than the pterygium.

A pair of small dissecting forceps, and a pair of very sharp scissars, suffice for the operation. Scarpa has found it unnecessary to detach every pterygium from its point to the termination of its basis; but only to continue the detachment from its point, as far as the commencement of the sclerotica, and then to complete its separation from the eye by a semilunar transverse incision [*], comprehending a portion of the conjunctiva one line in breadth. The subsequent part of the treatment chiefly consists in preventing inflammation.

2. ENCANTHIS.

The encanthis, in the incipient state, is a small, soft, red, and sometimes livid excrescence, growing from the caruncula lachrymalis, and neighbouring semilunar fold of the conjunctiva. In the inveterate state, its magnitude is considerable, and its roots extend beyond the caruncula lachrymalis, along the lining of one or both eyelids. The complaint excites chronic ophthalmy, prevents the complete closure of the eye, and by compressing and displacing the puncta lachrymalia, obstructs the free passage of tears into the nose. The surface of the excrescence is at first granulated like a mulberry; but, after the tumour has become large, only a part of its outside has the above appearance, while the rest seems like a smooth, whitish, ash-coloured substance. In this advanced state, the body of the encanthis divides (to use Scarpa's figurative expression) like a swallow's tail, so as to form two elongations, one of which extends along the inner snrface of the upper eyelid, the other along the inside of the lower one.

As of pterygium, so there is a malignant species of encanthis, denoted by its dull red colour, bleeding tendency, lancinating pain, excessive hardness, and very fetid discharge. The same practical observations apply to this case as to the cancerous pterygium.

The cure of this disease is accomplished by raising the tumour from its base, and lifting up the elongation, extending along the inside of the eyelids with a pair of forceps, and detaching them with a pair of sharp scissars, or a bistoury.

No more of the caruncula lachrymalis is to be removed than is absolutely essential to the success of the operation, as the deficiency would be likely to occasion an irremediable weeping of the eye.

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[*] See the shape of the incision, Plate VI. fig. 2.

CHAP. XV.

STAPHYLOMA

IS the name given to that disease of the eye, in which the cornea loses its natural transparency, rises above its proper level, and even projects between the eyelids, in the form of a whitish,, pearl-coloured tumour, which is attended with total loss of sight.

The malady commonly results from some violent species of ophthalmy, particularly that which is termed *purulent*, and affects children, and that which is consequent to the small-pox. As Scarpa observes, the staphyloma is one of the most serious diseases to which the eyeball is subject: for, to the total and irremediable loss of sight, are added all the evils which necessarily result from the protuberance of the cornea in advanced cases. The inability of closing the eyelids; the exposure of the eyeball to the contact of the air, and extraneous matter suspended in it; the friction of the eyelashes against the tumour; the incessant flux of tears down the subjacent cheek; render the eye painful and inflamed; sympathetically induce ophthalmy in the sound one; and cause ulceration, both on the diseased part of the eye, and on the lower eyelid and cheek.

The opacity being irremediable, the only surgical object is to prevent the inconveniences arising from the protuberance of the diseased cornea. In recent cases, when the tumour does not project forward, it is best to do nothing. In inveterate cases, the prominent part of the cornea must be cut off. Scarpa recommends doing the operation as far from the conjunctiva as the case will allow. This eminent practitioner introduces a knife, like that used in extraction of the cataract, completely across the staphyloma, at the distance of one line and a half, or two lines, from the centre of the tumour.

The lower half of the prominence is to be detached by pushing the knife onward, till its edge comes out through the membrane below; then the flap is to be turned up with a pair of forceps, and the incision rendered completely circular with the same bistoury. The aqueous humour, crystalline lens, and some of the vitreous humour, usually escape immediately after the operation, and the eye consequently becomes so diminished as to allow the eyelids to be shut. Ophthalmy and suppuration succeed. Emollient poultices are to be applied, until the violence of the inflammation has abated, the quantity of matter diminished, and the wound betrayed a disposition to heal. Then they may be left off, and occasionally touching the sore with the argentum nitratum, and applying a pledget over the eye, will complete the cicatrization.

Mr. Ware thinks the portion of diseased cornea, taken away in the foregoing manner, is too diminutive to allow the crystalline lens to escape without bruising the iris, and that it sometimes does not prevent the eye from becoming again distended with an aqueous fluid; he has, therefore, advised the circular incision of the cornea to be made about a quarter of an inch from the junction of that membrane with the sclerotica. *

CHAP. XVI.

PROLAPSUS OF THE IRIS.†

SOMETIMES, when the aqueous humour has escaped through an ulcer, or wound of the cornea, the iris is pressed forward by the humours situated behind it, until a portion of it protrudes from the eye, at the same opening through which the aqueous humour made its escape. The little tumour is of the same colour as the iris, viz. brown, or greyish, and is surrounded, at its base, by an opaque circle of the cornea.

If we reflect a little on the delicate structure of the iris, on the great quantity of blood-vessels which enter it, and the numerous nervous filaments which are distributed to it, we shall easily conceive the nature and severity of those symptoms, which are wont to attend this disease, how small soever the portion of the iris projecting from the cornea may be, even though not larger than a pin's head. Pain, similar to what would arise from something pricking the eye; an oppressive sense of tightness in the whole eyeball; inflammation of the conjunctiva and eyelids; a copious effusion of tears; and an absolute inability to endure the light; are the symptoms, which successively follow this complaint. The pupil deviates from the centre of the iris, towards the seat of the prolapsus, and

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* Transactions of the Medical Society of London, vol. i. art. 6.

† This is also named *staphyloma iridis.*

assumes an oval shape. In very old cases, the protruded portion of the iris seems frequently to become less sensible and irritable, so that the patients do not experience inconvenience equal to that just now related.

In the early stage of this disease, some recommend endeavouring to replace the iris in its proper situation, by means of a small probe, and, in case of difficulty, to dilate the opening in the cornea, by an incision, just as we are accustomed to do, in order to return a strangulated hernia. Others advise suddenly exposing the eye to a strong light, with a view of making the iris contract with sufficient force to disengage the protruded portion. Scarpa condemns every attempt of this sort, and maintains that, in this disease, the total loss of sight is prevented by the aqueous humour being kept from continually escaping, in consequence of the protruded part of the iris acting like a plug, and stopping up the aperture in the cornea. However, I think, no one can question the propriety of endeavouring to replace the iris, when it is recently protruded through a wound of the cornea. But when the prolapsus has existed some time, we ought probably to be content with accomplishing two objects; one is to diminish, as speedily as possible, the exquisite sensibility of the protruded portion of the iris; the other is to destroy gradually the projecting part of this membrane, sufficiently to prevent the little tumour from keeping the edges of the wound, or ulcer of the cornea, so much asunder as to impede cicatrization.

For this purpose, the projecting portion of the iris is to be touched with the argentum nitratum, so as to form an eschar. The patient experiences acute pain during the operation, but it soon subsides, when the eye has been bathed with warm milk. The consequent relief only lasts while the eschar remains adherent, and when this is detached two or three days afterwards, the above-mentioned complaints are experienced again, though in a milder degree. The caustic is now to be once more applied, and even used, if necessary, a third and fourth time, until the prominent part of the iris is sufficiently reduced to a level with the edges of the wound, or ulcer of the cornea, to create no obstacle to cicatrization. Then the surgeon is to be content with directing a vitriolic collyrium to be used, and the ung. hydrarg. nitrat. (lowered) to be smeared over the inner surface of the eyelids, every morning and evening.

Some recommend the projection of the iris to be cut off with a stroke of the scissars, but this method is deemed less successful than the plan already explained.

The shape of the pupil always remains somewhat oval. However, this is productive of a very trivial impairment of the sight, and in time, the opening in the iris becomes much wider, than it is immediately after the cure.

CHAP. XVII.

IRITIS.

NEXT to the conjunctiva, the iris is that texture of the eye which is most frequently affected with inflammation, and the changes which this process occasions, can no where else be so distinctly seen and examined. The iris often becomes inflamed, in consequence of surgical or accidental wounds of the eyeball. By many surgeons, a peculiar and characteristic iritis is supposed to be one of the constitutional effects of syphilis. The iris constitutes the principal seat of inflammation in the distinct kind of ophthalmy frequently met with in gouty constitutions. In the rheumatic ophthalmy *, the inflammation, though never originating in the iris, frequently extends to it. And lastly, an inflammation of this membrane sometimes accompanies cutaneous eruptions, particularly those which, though not syphilitic, have succeeded sores on the genitals, and are generally supposed to be connected with the abuse of mercury.

Scarcely any disease to which the eye is subject, has a more immediate or rapid tendency to destroy vision, than inflammation of the iris. In the *idiopathic iritis*, (as Professor Schmidt observes,) besides the common symptoms of ophthalmia, certain changes happen at the very commencement, indicating the seat of inflammation. The pupil appears contracted, the motions of the iris are less free, and the pupil loses its natural bright black colour. † The brilliancy of the colour of the iris fades, and it becomes thickened and puckered, with its inner margin turned towards the crystalline lens. The change of colour happens first in the lesser circle of the iris, which becomes of a darker hue; and afterwards in the greater circle, which turns green, if it had been greyish or blue; and reddish, if it had been brown or black. The redness accompanying these changes is by no means considerable, and is at first confined to the sclerotic coat, in which a number of very minute rose-red vessels are seen running in straight lines towards the cornea. In the words of Mr. Saunders, the vascularity of the sclerotica is very great, whilst that of the conjunctiva remains much as usual, the plexus of vessels lying within the latter tunic.' The inosculations of these vessels are numerous, and form a species of zone at the junction of the sclerotica and cornea. Here the vessels disappear, not being continued over the transparent cornea, as in a case of simple ophthalmy, but penetrating the sclerotica, in order to pass to the inflamed iris. The irritation caused by the light is distressing, and the patient is much incommoded by any pressure on the globe of the eye, or by the rapid or sudden motions of this organ. Considerable uneasiness is felt over the eyebrow, and acute lancinating pains shoot through the orbit towards the brain. The pupil loses its circular form, becomes somewhat irregular, and presents a greyish appearance. Examined by means of a magnifying glass, this appearance is seen to be produced by a substance very like a cobweb occupying the pupil, and which can soon afterwards be distinguished, even without the aid of the glass, to be a delicate flake of coagulable lymph. Into this, says Professor Schmidt, the processes or dentations of the irregular pupillary margin of the iris seem to shoot, and it is afterwards found that adhesions are apt to be established at these points. Owing to these adhesions, the patient, whose vision has been all along indistinct, now complains of being able to see only one side or part of an object. Occasionally, when the cornea has been attacked, it becomes cloudy, thickened, and adherent to the iris, before any visible effusion of lymph takes place; or, when the inflammation is violent, and extends to the other tunics, the eye is totally destroyed by suppuration; but the disease rarely advances to this extreme, and generally terminates in the adhesive stage. Lymph is then deposited on the anterior surface of the iris, and between the iris and the capsule of the crystalline lens, and often in so large a quantity, as to extend through the pupil, and drop pendulously to the bottom of the anterior chamber. If this process is not interrupted, the pupil is entirely obliterated, or the iris adheres to the capsule of the lens, leaving only a very minute aperture, which is most commonly occupied by an opaque portion of the capsule, or of organized lymph, and the patient is totally blind.*

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* The best description of this case is contained in Beer's Lehre von den Augenkrankheiten, b. i. p. 387, &c. Wien, 1813.

† Ueber Nachstaar und Iritis nach Staar—Operationen von Dr. Joh. Adam Schmidt. 4to. Wien, 1801. This publication comprehends many valuable observations upon secondary cataract, as well as iritis, which term was first introduced by the author.

This state of the eye is named by Schmidt *atresia iridis completa*, or *closed pupil*. Sometimes the result is not quite so unfavourable. Perhaps no abscess has formed, and the effused lymph has not been so copious. When the inflammatory symptoms subside, the iris, though remaining considerably expanded, is found still to possess some degree of mobility, and its natural colour has nearly returned. Though the pupil is unusually contracted, the piece of coagulable lymph, which occupies it, is reduced by absorption to the state of a thin membrane, which is opaque towards its centre, but somewhat transparent at the edges: the pupillary margin of the iris does not adhere all round to this membrane, but only at some points, the others remaining free; vision is impaired, but not destroyed. This constitutes *atresia iridis incompleta*, or *contracted pupil*.

At other times, only part of the iris has been affected with inflammation. When this has gone off, a mere thread of opaque matter remains in the otherwise transparent pupil. By this a single point of the pupillary margin of the iris is held fixed, while every other part is free, and its motions perfect. This is the *atresia iridis partialis*.†

Professor Schmidt, Beer, and many English surgeons believe, that the iris is subject to an inflammation, which is as characteristic of the presence of syphilis in the constitution, as any other secondary symptom. The affection of the iris may appear in company with all the other constitutional symptoms of lues, or it may take place singly, before any of these have yet appeared. A pale redness all round the cornea is the first symptom perceived in the *syphilitic iritis*: this is at first seated in the sclerotic coat alone, but the conjunctiva very soon shares in it, and afterwards becomes the redder of the two. However few the vessels may be elsewhere, there is always a broad zone of them all round the cornea. The redness has a peculiar tint, being brownish, something like the colour of cinnamon.‡ From this zone, the vessels have a tendency to be prolongated under the edge of the cornea. The whole of this last membrane now becomes uniformly hazy, losing its clearness, without being in any place actually untransparent. The pupil becomes contracted, and the iris limited in its motions, as in common iritis, but the pupil, instead of preserving its natural situation, is removed in a direction upwards and inwards towards the root of the nose, and is irregular. The iris also loses its natural colour, and projects forwards. An aggravation in the symptoms always takes place towards evening, the intolerance of light and painful sensibility of the whole eye increasing, and a gush of tears following every change of light and temperature. At length a regular nightly pain begins, which is extremely severe, and strictly limited to that part of the cranium which is immediately over the eyebrow. It usually comes on between six and seven in the evening, gradually increases, reaches its utmost height about midnight, and then diminishes till about four or five in the morning, when it ceases. After every such attack of pain, the pupil is found more contracted, drawn farther upwards and inwards, the iris being at the same time more altered both in colour and form, the quantity of lymph increased, and consequently vision more impeded.

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* See a Treatise on some Practical Points relating to Diseases of the Eye, &c. by J. C. Saunders, p. 21—23. Schmidt über Nachstaar und Iritis; and Beer von den Augenkrankheiten, b. i. p. 432, &c.

† Schmidt, p. 59.

‡ The conjunctiva and sclerotica "have a brick-dust or dusky red, instead of a bright scarlet hue, and the lymph is compact and brown, and intimately adhering to the iris, instead of curdlike, loose, and of a yellowish white colour." Travers in Surg. Essays, part. i. p. 69.

Peculiar appearances then take place in the iris, for either on its pupillary, or ciliary margin, or on both, there arise one or more reddish-brown tubercles, which have a spongy look. Their growth is pretty rapid. Lardy-looking ulcers also sometimes appear on the cornea and white of the eye, or on the integuments of the eyelids. Even when syphilitic iritis terminates in the most favourable manner, the eye for a long time afterwards is peculiarly sensible to the influence of cold and moisture. On every exposure to these, the organ becomes morbidly sensible to light, exhibits a slight blush of red, and discharges tears. Indeed, frequently for more than a year afterwards, on every sudden change of temperature, a pale violet-coloured zone appears around the cornea, but goes off when the eye has remained for some time exposed to the same temperature.

In the iritis, which appears in conjunction with eruptions, supposed to be connected with the abuse of mercury, the inflammation seems less active than in the other kinds. The pupil is not much contracted, and lymph is less apt to be effused. A vesicle full of yellow matter sometimes rises on the iris, without any other alteration in this membrane than that of colour, the pupil remaining almost unchanged. By the use of proper remedies, this vesicle, even when it seems quite ready to burst, can generally be made to disappear in a few days, without any rupture taking place. The blood-vessels of the conjunctiva are large and distended, without being varicose, and run quite to the edge of the cornea. *

TREATMENT.

From the preceding description, it is evident that the principal danger in iritis depends upon the effusion of lymph, its quick organization, the rapid formation of adhesions between the iris and other parts, and the closure and obstruction of the pupil. Of late years, great improvement has unquestionably been made in the treatment of this disease, an improvement derived from a knowledge of the fact, that mercury is one of the most effectual means of stopping the effusion, and promoting the absorption, of lymph in the adhesive inflammation. †

In the idiopathic iritis, before lymph is effused, copious bleeding either from the temporal artery or veins of the arm, and cathartics, followed by nauseating doses of tartarized antimony, with a view of enfeebling the pulse, are the means from which most benefit may be expected. When general bleeding has been carried as far as the state of the pulse will allow, leeches are to be applied to the vicinity of the eye, and their application repeated at short intervals. When the inflammation stops in this stage, the cure may be completed by covering the eye with linen wet with a collyrium of the acetite of lead ‡, and keeping the patient for some time in a dark room. Professor Schmidt, however, describes cold local applications as quite useless in iritis, and he says, the only topical treatment which is admissible, is the fomentation of the eye with water, made as warm as the patient can bear, which will sometimes mitigate the violence of the pain. In

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* For the above excellent descriptions of common iritis, and of the cases regarded as syphilitic, or depending on the abuse of mercury, I am indebted to an analysis of Schmidt's matchless work, in a new publication, which promises to be of great utility to the profession, and I hope will meet with due encouragement; the "Quarterly Journal of Foreign Medicine and Surgery, and of the Sciences connected with them." London, Nov. 1818. In this number may also be found Schmidt's account of two other forms of iritis, viz. that which occurs in gouty subjects, and that which follows rheumatic inflammation of the eye.

† See Dr. Farre's Letter in the Surgical Essays, by Messrs A. Cooper and Travers.

‡ Saunders, op. cit.

the first stage of the process, he observes, that blisters to the temple, or behind the ears, have little or no effect, though a large one on the nape of the neck sometimes seems to be of service.

When the disease, however, advances to the stage in which the effusion of lymph begins, every possible means must be adopted for resisting this process, and bringing about the absorption of the substance already deposited in the posterior chamber, in the pupil, or upon the iris. Of all remedies for this purpose, none merits so much encomium as mercury, which must be freely exhibited, in order to affect the constitution as soon as possible. The ointment, or the pil. hydrarg. with opium, may be employed, and often it is right both to exhibit the medicine internally, and have recourse to frictions. In this second stage of iritis, Professor Beer gives calomel united with opium, applies to the eye a solution containing oxymuriate of mercury, mucilage, and a considerable quantity of vinum opii; and when this collyrium loses its effect, he introduces daily between the eyelids a small quantity of a salve, composed of two drachms of fresh butter, six grains of red precipitate, and eight grains of extract of opium. He observes also, that frictions once a day, over the eyebrow with mercurial ointment, containing opium, will very much assist in producing an absorption of the effused lymph. * The tendency of the iris to expand, and the pupil to contract, the late Mr. Saunders used to oppose by the use of the extract of belladonna, with which he sometimes smeared the eyelids and eyebrows; or after thinning the preparation with water, so as to make it of the consistence of cream, he introduced a few drops of it under the eyelids, as is done with the vinum opii.

In the case regarded by authors as syphilitic, general bleeding is not considered so indispensable as in the idiopathic iritis. When severe pain in the eye and headach prevail, leeches are to be applied to the eyebrow and a purgative given. The nightly attacks of pain, which are so invariably followed by an aggravation of all the symptoms, are to be prevented by rubbing well into the part over the eyebrow a small quantity of mercurial ointment with opium, a short time before the pain is expected to come on, and then covering the eye with a folded piece of warm linen. This plan is to be repeated, when the pain threatens to come on about mid-

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* Beer, Lehre von den Augenkrankheiten, b. i. p. 450. Wien, 1813.

night. In conjunction with these means, mercury must be employed so as to affect the constitution, either in the form of ointment, or of calomel pills with opium, which last must be taken two or three times a day.

The form of iritis, conjectured to proceed from the abuse of mercury, or accompanying papular and other eruptions not truly syphilitic, also requires for its cure a combination of the depleting with the mercurial plan. This circumstance, in respect to the first of these cases, is what nobody could have expected *à priori*, as it involves the seeming inconsistence of mercury being both the exciting cause and the antidote of the disease. But, though no doubt can be entertained about iritis presenting itself in the forms above described, the same degree of certainty does not exist with regard to either mercury or syphilis being really causes of the disorder. These are points which appear to me far from being yet ascertained. *

CHAP. XVIII.

CLOSURE OF THE PUPIL.

WHEN this occurs, it is most frequently the consequence of a violent inflammation of the internal membranes of the eye, especially the iris, in consequence of an operation, or other causes adverted to in the preceding chapter. In particular instances, the malady follows the extraction and depression of the cataract, but without an inflammatory affection of the interior of the eye appearing to have any share in its origin. After an indeterminate time from the operation, the pupil is perceived to diminish in diameter daily, without any evident cause, and ordinarily closes so much, that it can hardly admit a pin's head. The iris is motionless, assumes a radiated rugose appearance, and, when no opacity exists behind it, a little black speck is seen in its centre. In this state, if the retina be sound, the patient may sometimes regain a considerable power of vision, by having an artificial pupil formed.

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* See on the subject the observations of Mr. Travers, in his Surgical Essays, part i.; also Carmichael's remarks in Obs. on the Specific Distinctions of Venereal Diseases, p. 31, &c.

Cheselden was the first who performed an operation, with a view of diminishing the blindness produced by this malady; he introduced a couching needle, having a sharp edge only on one side, through the sclerotica, about a line and a half from the margin of the cornea. After perforating the iris, towards the external angle, and then pushing the point of the needle transversely through the anterior chamber, as far as the edge of the iris next the nose, he turned the edge of the instrument backward, and withdrew it, so as to make a transverse division of the iris.

Janin practised this method in two instances, but without success, as the edges of the opening after a time united *; and Sharp also experienced a failure from the same cause. † Janin found, that the best plan was that of opening the cornea, as is done in the extraction of the cataract, and then dividing the iris with the scissars, from below upwards, near the pupil, on the side next the nose.

This mode seems liable to the very objection which Janin urged against the transverse division of the iris, namely, that of sometimes failing, in consequence of the tendency in the opening to close again.

Hence, Baron Wenzel practised the excision of a portion of the iris. He introduced the point of the cornea knife into the anterior chamber, exactly in the same manner as in the extraction of the cataract, but when it had arrived nearly as far as the centre of the iris, it was plunged into this membrane, and then, by a slight motion of the hand backward, it was brought out again, about the distance of three quarters of a line from the part in which it entered. Next, the incision being continued as in cases of cataract, the section of the iris was completed before that of the cornea, and presented a small flap, which was cut off with a pair of ‡ scissars. The late Mr. Ware recommended the opening to be made at least one-eighth of an inch in width, as this size does not exceed that of the natural pupil, and the operator will then be better able to extract the crystalline lens, if diseased.

Beer opens the cornea, draws out the iris by means of a fine hook, and removes a small portion of this membrane.

Mr. Gibson recommends making a puncture in the cornea,

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* Mémoires sur l'Oeil, p. 182, 185.

† Operations of Surgery, chap. 29.

‡ Wenzel on the Cataract, p. 270—272.

Plate VII

Fig 1.

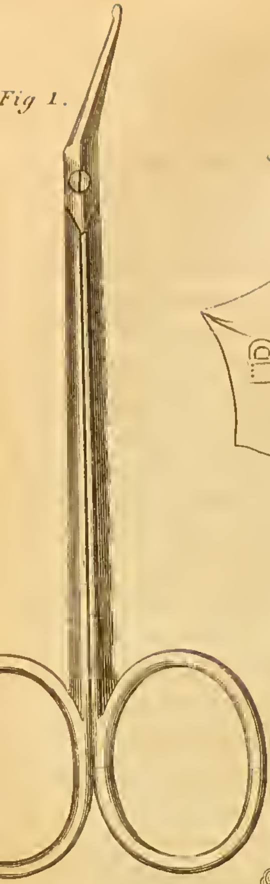


Fig 5.

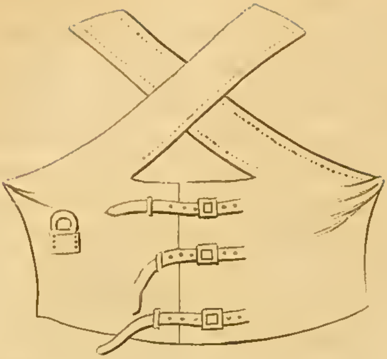
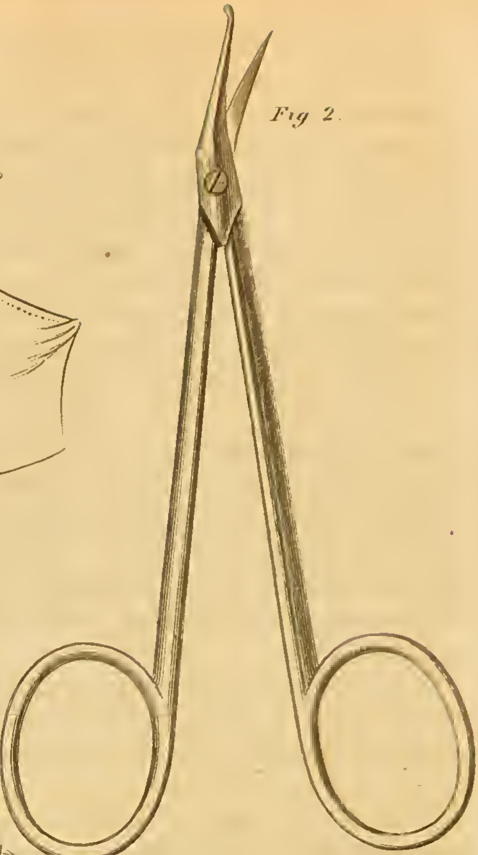


Fig 2.



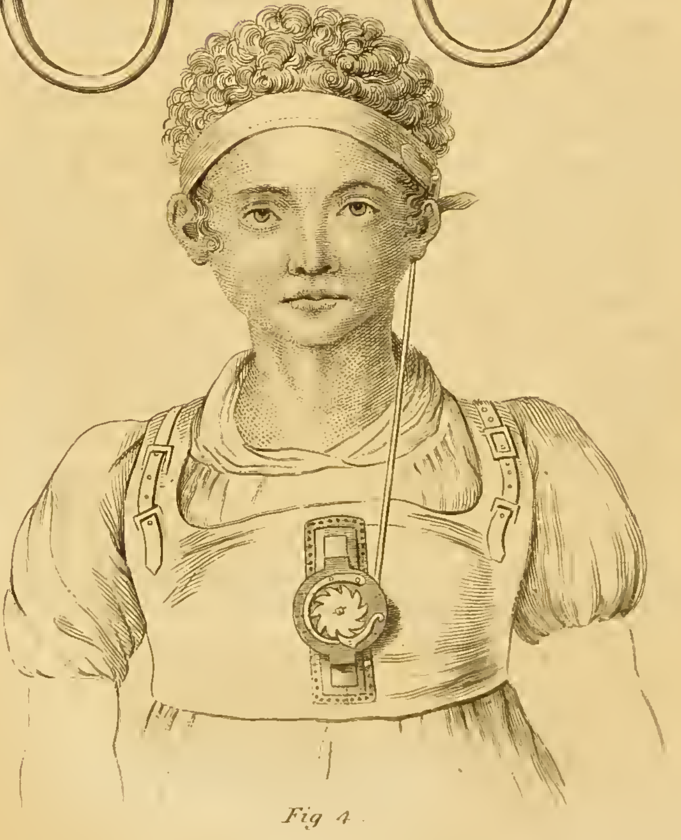


Fig 4.

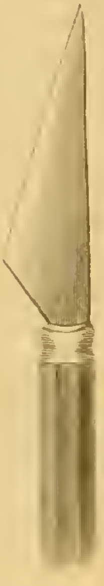


Fig 3

ig 6.

Milton sculp

London. Published March 24. 1819. by Longman & Cº Paternoster Row.

with a broad cornea knife, within a line of the sclerotica, to the extent of about three lines. All pressure is now to be removed from the eyeball, and the cornea knife gently withdrawn. The consequence of this is, that a portion of the aqueous humour escapes, and the iris falls into contact with the opening in the cornea, and closes it like a valve. A slight pressure must now be made upon the upper and inner part of the eyeball, and be gently increased or varied in direction, till the iris gradually protrudes, so as to present a bag of the size of a large pin's head. This protruded portion must be cut off with a pair of fine curved scissars, and all pressure at the same time removed. The iris will then recede within the eye, and the piece that has been removed will leave an artificial pupil more or less circular. *

When the centre of the cornea is so opaque, that the rays of light cannot enter the natural pupil, and the circumference of that membrane is transparent, vision may be materially improved, by removing a portion of the iris opposite the undiseased part of the cornea.

In order to make an artificial pupil, Scarpa formerly recommended detaching with a couching needle a certain extent of the circumference of the iris, from the ciliary ligament, on the side towards the nose. In the last edition of his work on diseases of the eye, however, he informs us of the preference which he now gives to M. Maunoir's method, experience having convinced him, not only that his own plan is inapplicable to many complicated cases of closure of the pupil, but that the opening afterwards grows so narrow as to be useless. In Maunoir's operation † an incision is made in the cornea, at its lower or lateral segment, as may be most convenient, of half the extent of that which is usually made for the extraction of the crystalline lens. The surgeon is then to use a pair of very fine scissars ‡, the upper blade of which is probe-pointed, while the lower one has a point as sharp as that of a lancet. Through the small opening in the cornea the scissars are introduced shut, with the flat part in a line parallel to the transverse diameter of the iris, and as soon as the point of the instrument has nearly reached the great margin of the iris, nearly opposite the incision in the cornea,

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* Gibson's Pract. Obs. on the Formation of an Artificial Pupil.

† Maunoir, Mémoires sur l'Organization de l'Iris, et l'Opération de la Pupille Artificielle. Paris, 1812; and Scarpa, Oss. sulle Malattie degli Occhi. Ediz. quinta.

‡ Plate VII. fig. 1. and 2.

it is gently opened, and turned in such a manner that the point of the lower blade may perforate the iris, and pass over its posterior surface, until the other probe-point has reached the part where the cornea and sclerotica join. The iris is then to be cut in its transverse diameter by a single stroke, as nearly as possible through its centre. Another incision is then to be promptly made, diverging from the first, so that the two cuts may produce in the middle of the iris a triangular flap, shaped like the letter V, with the apex exactly in the centre of the iris, and the base near its great margin. Five or six days afterwards, the apex of this triangular flap is found retracted towards its base, leaving in the centre of the iris an artificial pupil of the figure of a parallelogram, or of a crescent. *

CHAP. XIX.

HYPOPIUM, OR ABSCESS IN THE ANTERIOR, OR POSTERIOR CHAMBER OF THE EYE.

HYPOPIUM is an accumulation of a glutinous yellowish fluid, like pus, in the anterior chamber of the aqueous humour, and frequently also in the posterior one, in consequence of violent ophthalmy.

The symptoms exciting apprehension of an hypopium, are the very same which occur in the highest stage of violent acute ophthalmy, viz. prodigious tumefaction of the eyelids, redness and swelling of the conjunctiva, as in chemosis; burning heat and pain in the eye; pains in the eyebrow and nape of the neck; fever; restlessness; aversion to light, and a contracted state of the pupil.

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* The limits of this work forbid an extension of the subject, which I quit the more willingly, as additional observations upon it are contained in the Dictionary. Other plans of forming an artificial pupil are detailed in Sir W. Adams's Observations on Ectropium, 8vo. Lond. 1812; Assalini's Ricerche sulle Pupille Artificiali, 8vo. Milano, 1811; Reisinger's Darstellung eines neuen Verfahrens die Mastdarmfistel zu unterbindung, und einer leichten und sichern Methode kunstliche Pupillen zu bilden. 8vo. Augsburg, 1816; Flajani, in Collezione di Osservazio, &c. di Chir. t. iv. p. 129.; Donegana, Della Pupilla Artificiale Ragionamento, Milano, 1809.

As soon as the hypopium begins to form, a yellowish, semilunar streak makes its appearance at the bottom of the anterior chamber, and regularly as the glutinous fluid is secreted, it increases in all dimensions, and gradually obscures the iris, first its inferior part, next where it forms the pupil, and lastly, its whole circumference. While the inflammatory stage of the violent ophthalmy lasts, the hypopium never fails to enlarge; and as soon as this stage ceases, and the ophthalmy becomes connected with local weakness, the hypopium leaves off increasing, and from that moment is disposed to diminish.

During the first stage of violent ophthalmy, while the hypopium is increasing, the same treatment as is recommended for severe acute inflammation of the eye is the most proper. In the second stage of the ophthalmy, when the hypopium has become stationary, surgeons, little versed in the treatment of diseases of the eyes, would suppose that an opening ought to be made in the most depending part of the cornea. But experience proves, that dividing this membrane, in cases of hypopium, is seldom successful, and most frequently gives rise to evils worse than the hypopium itself, viz. the reproduction of violent ophthalmy; a greater effusion of matter into the chambers of the aqueous humour; and an ulcer of the cornea, attended with prolapsus of the iris. Scarpa only admits the propriety of making an opening in one particular case, which is, when the quantity of extravasated matter is so considerable, that the excessive distension, which it produces of all the coats of the eye, occasions such vehement symptoms, as not only threaten the entire destruction of the organ, but even endanger life.

From knowing that blood extravasated in the eye in consequence of blows, that the fragments of membranous cataracts, that milky and caseous cataracts, nay, that the firm crystalline lens itself can be totally removed by the lymphatics, we may easily conclude, that the resolution of an hypopium, by means of absorption, is the primary indication, to which the surgeon should direct his attention. After subduing the violence of the ophthalmy by the most rigorous employment of the antiphlogistic treatment, the surgeon must endeavour to quicken the action of the absorbents in the eye. Camphorated emollient poultices may be applied; the vapours of the spir. ammon. comp. may be directed against the eye, through a tube two or three times a day; a blister may be put on the nape of the neck, and when the irritability of the organ has diminished, the vitriolic collyrium may be used. This may be afterwards strengthened by the addition of a few drops of camphorated spirit. Under such treatment, the hypopium most commonly disappears, in proportion as the chronic ophthalmy is relieved.

But success does not invariably follow the most skilful treatment, and sometimes nothing can prevent ulceration, opacity, and bursting of the cornea, and prolapsus of the iris.

In the chapter on ophthalmy, I have taken notice of Mr. Wardrop's plan of puncturing the cornea, who, in recommending this operation in every case of inflammation of the eye, attended with the least appearance of hypopium, differs materially from Professor Scarpa.

CHAP. XX.

DROPSY OF THE EYE.

WHEN the secerning extremities of the arteries, and the minute mouths of the absorbent vessels of the eye do not act in their naturally reciprocal manner, the organ may become distended with a morbid redundance of an aqueous secretion. This disease constitutes what is termed dropsy of the eye, and is at first attended with great weakness, and afterwards with total loss of sight.

Scarpa inclines to the opinion, that, in the generality of instances, the disorder chiefly depends on a diseased secretion of the vitreous humour, and also occasionally on a morbid alteration of the alveolary membrane, by which this humour is produced. The eye assumes an oval shape, terminating in a point on the cornea, and, as the organ enlarges in all dimensions, it projects from the orbit, so as to cause great deformity, and prevent the closure of the eyelids.

The disease is sometimes preceded by blows on the eye, or adjoining temple; sometimes, by an obstinate internal ophthalmy. In other instances, it is preceded by no inconveniences, except an uneasy sensation of tumefaction and tension in the orbit, a difficulty of moving the eyeball, and a considerable impairment of sight. When the eye has assumed an oval figure, and the anterior chamber has become preternaturally capacious, the iris seems situated backward, in an unnatural degree, and tremulates in a very singular way on the slightest motion of the eyeball. The pupil remains dilated in every degree of light, while the crystalline is sometimes discoloured from the very beginning of the disease, and in other instances, does not become opaque, till the affection has arrived at its highest pitch. While the eye is not considerably enlarged, and the crystalline is not deeply opaque, the patient can usually distinguish the outlines of objects and brilliant colours. But when the eye has acquired a larger volume, and the whole crystalline has become opaque, the retina is rendered completely paralytic, probably by the excessive distension which it suffers.

In the last stage of the disease, when the dropsical eye projects from the orbit, so as not to admit of being covered by the eyelids, with the inconveniences already enumerated others associate themselves, arising from the dryness of the eye; the contact of extraneous bodies; the friction of the eyelashes; the very viscid secretion from the eyelids; the ulceration of the lower eyelid, and even of the eye itself. Hence, the advanced stage of dropsy of the eye induces violent ophthalmies, followed by ulceration and a total destruction of the organ. The disease may even increase in such a degree, as to prove fatal.* In cases of this aggravated description, the bones of the orbit are generally carious.

In the incipient period of the disease, it is usual to prescribe mercurials, or cicuta, and make a seton in the nape of the neck. Scarpa describes astringent applications as hurtful, and recommends the eye to be bathed with a decoction of mallows.

When the disease has attained such a pitch, that the eye protrudes from the orbit, there is no means of opposing the grievous dangers now impending, except making an incision, in order to evacuate the superabundant fluid in the eye. To defer the operation any longer is the same thing as abandoning the patient to the inconvenience of an habitual ophthalmy, the danger of ulceration of the eyeball and lower eyelid, and, what is worse, of carcinoma of the whole eye. Simply puncturing the eye is no more adequate to produce a permanent cure of the dropsical affection, than puncturing the tunica vaginalis is sufficient to effect a radical cure of the hydrocele. Besides discharging the redundant humours contained in the organ, inflammation and suppuration must be excited.

The best method is that which is practised by Scarpa for the cure of the inveterate staphyloma. A portion of the centre of the cornea, about as broad as a pea, is to be cut out, and so much of the humours is then to be pressed out as will permit the eyelids to be brought over the eye. Nothing but a pledget of dry lint, kept on by a bandage, is to be applied before the inflammation has taken place, which is usually about the third or fifth day. Then antiphlogistic means may be adopted, and emollients employed.

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* Louis, in Mém. de l'Acad. de Chirurgie, tom. xiii. p. 282. edit. 12mo.; and Terras, in Journ. de Médécine, tom. xlv.

After operating for the relief of the present affliction, a fungus occasionally grows out of the internal part of the eye. Such an excrescence was, in one instance, destroyed by the external employment of belladonna.* But, in case this or other means fail in preventing the reproduction of the fungus, it is the duty of the surgeon to recommend the entire extirpation of the diseased organ.

In cases of hydrophthalmia, it has been proposed to introduce a seton through the eye, for the purpose of lessening the size of the organ †; a suggestion of which Scarpa entertains an unfavourable opinion.

CHAP. XXI.

CANCER AND EXTIRPATION OF THE EYE.

CARCINOMA of the eye is said to make its appearance in three forms. Sometimes the eyeball becomes irregular and knobby, and swells to the size of an apple; the sight is gradually lost; the blood-vessels in the white of the eye enlarge; and the whole external and internal structure of the organ becomes so altered, that the part resembles a piece of flesh, and no vestiges of its original organization remain. Sometimes a portion of the cornea is still visible, within which a small aperture is also discernible, through which can be distinguished the remains of the vitreous humour, and of the choroid coat. In some instances, the eyeball is ulcerated, and emits a fetid discharge; while, in others, there is not the smallest appearance of ulceration, and the eyeball resembles a piece of firm flesh. The patient usually experiences from the first considerable burning, and at last, violent darting pains in the organ extending over one side of the head. This is the most frequent description of cancer of the eye.

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* Terras, Journal de Médécine, tom. xlv.

† Ford, in Medical Communications, vol. i. p. 409.

Sometimes excrescences form upon the anterior surface of the eye, especially upon the transparent cornea, and frequently admit of being radically cured by the knife, caustic, or ligature. But, occasionally, they repeatedly grow again after the employment of these means, becoming broader, more malignant, and even cancerous, and at length, changing into a spongy fungus, which is very painful, covers the whole anterior surface of the eye, and renders extirpation indispensable. This is the second species of cancer of the eye.

On several occasions, ulcers form on the front of the eyeball, which, though generally curable by proper means, sometimes are exceedingly inveterate, entirely destroying the eyesight, and becoming so malignant as to obtain the appellation of cancer. This is the third form of the disease.*

We here find a variety of diseases described under the common name of cancer, though, in all probability, they are not at all analogous either to each other, or to the carcinoma of any other part of the body.

Until lately, also fungus hæmatodes of the eye has generally been confounded with cancerous affections, as will be explained in the ensuing chapter.

Scarpa is perfectly correct in representing cancer of the eye as less destructive than fungus hæmatodes; first, because it makes its earliest appearance on the exterior parts of the eye, so that whatever relates to the origin and formation of the disease is open to observation; and, secondly, because the cancerous fungus of the eye is very frequently, not actually malignant at first, but becomes so in process of time, or from improper treatment, in consequence of which it assumes the real character of scirrhous, and, afterwards of phagedenic cancer, during which interval the art of surgery may be resorted to with effect. According to the same writer, we have no pathognomonic symptoms, excepting one, indicative of the exact period when the sarcoma of the eye changes from a benign fungus to carcinoma. The exquisite sensibility, darting pains, rapidity of growth, colour, and ichorous discharge, are by no means a sufficient criterion, and, says Scarpa, the only symptom, if not entirely pathognomonic, at all events less uncertain than any other, is the almost cartilaginous hardness of the malignant ulcerated fungus, which induration is not met with in the benign fungus, and never fails to precede the formation of cancer. *

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* See Richter's Anfansgrunde der Wundarzneykunst, band. iii. p. 415—417.

Under particular circumstances, it becomes indispensably necessary to remove the eyeball; as, for instance, when the organ protrudes from the orbit, cannot be reduced, and the disease creates both great irritation and disfigurement. The operation is also requisite for certain cases of ulcerated staphyloma, and for every form of disease, in which the coats and humours of the eye are so altered, as not to admit of being restored to a natural state, and in which the distemper, if unextirpated, would be likely to end fatally, either by extending its ravages to the orbit and adjacent portion of brain, or by keeping up such pain and irritation as must first debilitate the constitution, and ultimately destroy life.

Cancer and fungus hæmatodes of the eye, however, are the two diseases, for which the operation is most commonly required.

What is usually called a cancer of the eye does not seem to be nearly so malignant as carcinoma of the breast; for, if the distemper be confined to the globe of the eye, the eyelids, cellular substance, and bones of the orbit continuing unaffected, the operation almost always produces a radical cure. The knowledge of this circumstance should lead us to undertake the operation in good time, and we may the more readily make up our minds to perform it, since vision is always irrecoverably lost. †

In the performance of the operation, there are two important circumstances to which attention ought to be paid. The first is to remove every particle of the disease, and leave none of the affected parts behind. The second is to avoid piercing or injuring the orbit, behind which the dura mater is immediately situated. The apprehension, indeed, of hurting the brain made Bartisch, and Fabricius Hildanus, the earliest performers of this operation, employ instruments without any sharp point. But, as a pointed scalpel may be used with safety and advantage by any man of moderate skill and care, it is generally preferred by all the best surgeons of the present day.

In order to be able to separate the eyelids far enough from each other, for the easy removal of an eye that is much enlarged, it is sometimes recommended, in the first instance,

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* Scarpa on Diseases of the Eyes, p. 511—513. Transl. by Briggs, edit. 2.

† Richter, op. et loc. cit.

to make an incision through them at their external commissure.* The patient should lie down on a table of convenient height, with his face exposed to a good light. The generality of surgical writers † advise the operator, before he begins the dissection, to introduce a strong ligature through the anterior portion of the diseased organ, by which means the part may be drawn out, or to either side, as the convenience of the surgeon may dictate, while he is making the necessary incisions. Hooks have also been recommended for the same purpose. But Scarpa is silent respecting these means, which he must therefore consider unnecessary; a sentiment in which I readily concur.

The best instrument for the operation is a common scalpel. When the diseased part is very large, a knife, somewhat curved, has been occasionally used for dividing the parts deeply situated in the orbit. M. Louis, Bertrandi, and Scarpa, use a knife for the division of the conjunctiva and superficial connections, and complete the rest of the incisions with a pair of curved scissars.‡ The patient being placed in a horizontal posture, and the upper eyelid raised by an assistant, and the lower one depressed by the surgeon himself, the conjunctiva, connecting the eye with the two eyelids, is first to be divided.

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* Richter and Desault are advocates for this practice, which will generally be found materially to facilitate the rest of the operation. See Anfansgr. der Wundarzneykunst, band. iii. p. 418., and Œuvres Chir. de Desault, tom. ii. Sometimes, however, this proceeding is not necessary; as when the eyeball is not very large, or it can be lessened by a puncture, in consequence of containing fluid. Bertrandi observes, " Quelquefois le volume de la tumeur est si considérable, que, faisant autour des paupières comme un ceinture très-étroite, il paroît qu'on ne la peut pas extirper sans faire une dilatation à leur commissure externe, qu'on doit cependant éviter, quand cela est possible. Croyant dans un cas pareil, à cause d'un gonflement que je sentois à un des angles d'un œil fongueux, qu'il y avoit de l'humeur épanchée dans l'œil je le percai; il sortit la valeur d'une cuillerée de cette humeur; l'excroissance diminua de volume, et j'eus la facilité de faire pénétrer l'aiguille par derrière, et d'emporter l'œil, sans endommager les paupières." See Traité des Operations de Chirurgie, p. 520. Paris edit. 1784.

† See Bertrandi, Opere cit. 519.; Ware in Trans. of the Medical Society of London, vol. i. p. 149.

‡ See Mém. de l'Acad. de Chir. tom. xiii. p. 329. edit. 12mo. Scarpa on Diseases of the Eyes, by Briggs, p. 530. edit. 2. Bertrandi recommends the employment of a scalpel, the cutting edge of which extends only a little way from the point. By this means, the operator will run no risk of wounding the eyelids. All the necessary incisions are unquestionably made by that part of the edge of the knife which is near the point, and as the rest of the edge may do injury, and cannot be useful, Bertrandi's advice may deserve attention.

As when the eyeball is enlarged, it mostly falls towards the cheek, so that an incision between the diseased part and the lower eyelid cannot easily be made, Richter recommends first separating the globe from the upper eyelid, then dividing the superior and lateral attachments of the eye; and, lastly, its connections with the lower eyelid. This mode of operating is said to be the more easy, because the globe of the eye can always be more readily inclined downwards, so as to make room above, than pushed upwards for the purpose of making room below.

Scarpa, after dividing the external commissure of the eyelids, if the tumour be very large, perforates the conjunctiva at the external angle, and from thence, keeping the knife close to the upper plane of the orbit, as far as the caruncula lachrymalis inclusively, cuts through the elevator muscle of the upper eyelid, the tendon of the greater oblique muscle, and the superciliary nerve. The diseased eyeball being then raised, and the lower eyelid depressed, the incision is next continued along the inferior segment of the orbit, from the external towards the internal angle; by doing which, the knife will penetrate between the orbit and lesser oblique muscle, and not pass between the eyeball and this muscle, as would happen in cutting in the opposite direction. The eye freed from these attachments, and from that formed by the nasal branch of the ophthalmic nerve, will fall on the external side of the orbit, and give the surgeon room on the internal side as far as the bottom of the orbit, where he is to divide with one stroke of the scissars the origin of the muscles of the eye and the optic nerve. He is then gently to bring his finger round to the external side of the orbit, and push its contents a little towards himself, while, with a second stroke of the scissars, he divides all the parts which enter the orbit through the sphæno-orbital fissure. *

Until the optic nerve has been divided, the operator must avoid drawing the eyeball too forcibly forwards.

As soon as the eye has been completely detached, all the inside of the orbit should be very carefully examined, and whatever indurated parts are found should now be diligently removed. In particular, the surgeon should introduce his finger along the inner side of the orbit, where he will feel the greater oblique muscle, which he must dissect away by means of a tenaculum and the scissars.

All writers agree concerning the propriety of cutting away

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* Scarpa, op. cit. 529.

one or both the eyelids, whenever they are affected with cancerous disease; but in all other instances they should be spared.

Authors likewise universally acknowledge the prudence of never leaving the lachrymal gland behind, as it is now useless, and is particularly apt to be the source of those inveterate fungous diseases which sometimes follow the operation.

The bleeding is seldom of any importance, generally stopping as soon as the orbit is filled with soft pieces of lint, and a compress and bandage are applied.

When the patient suffers violent pain after the operation, an anodyne should be given, and, if necessary, repeated in a few hours. The inflammatory symptoms and fever rarely demand any other means than a low diet, keeping the bowels well open, and giving saline medicines. This plan is only to be adopted a short time, after which a light preparation of cinchona and a nutritious diet are to be prescribed. *

Sometimes, after a week or ten days, the upper eyelid becomes drawn within the lower one, so that the eyelashes rub against the inside of the latter part, and cause a painful irritation. This inconvenience may be prevented by means of a slip of adhesive plaster, with which the upper eyelid is to be held upward towards the forehead. †

Although the operation mostly succeeds when the disease is limited to the eyeball; the event is extremely doubtful, when the adjacent parts are affected. When also the case is a fungus hæmatodes, the complete extirpation of the eye, although performed on the first appearance of the disease, is generally useless, and rather accelerates the death of the patient. ‡

Sometimes, the granulations, which are formed in the orbit after the operation, are flabby and indolent, in which circumstance, a mild astringent should be applied; as, for instance, lapis calaminaris, pulvis myrrhæ, alumen ustum, &c. In certain examples, the granulations acquire a fungous and malignant nature, in which event, they should either be cut away with a scalpel, or be destroyed with caustic. Too often, however, the fungus is continually reproduced, and proves fatal. The records of surgery inform us, that, in some cases, the cure has appeared perfect for half a year, or more, and

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* Ware, in Trans. of the Med. Society of London, vol. i. p. 154.

† Idem, op. cit.

‡ Scarpa, op. cit. p. 526. This distinguished surgeon is not exactly correct in stating, that an operation has never succeeded, as will appear when we come to the next chapter.

then a fungous excrescence has arisen and proved [*] fatal: Sometimes, a few days or weeks after the operation, headaches, vomiting, convulsions, &c. have been known to come on, and end fatally. [†] It is said, that in such cases the cancerous distemper has been discovered to have spread to the brain, along the optic nerve, and to have excited induration and ulceration of that viscus. That the fungus hæmatodes also does so is no longer doubtful. Convulsions, after the operation, were suspected in one case to be owing to the pressure of the lint in the orbit on the optic nerve; and hence, the late Mr. Ware renounced the plan of introducing dressings within the eyelids. [‡]

That carcinoma will sometimes recur, even though every discernible portion of the distemper has been most carefully removed [§], is an unfortunate truth, for which every practitioner should be prepared, in order that he may never presume to give a prognosis, which may injure his reputation. However, now that surgeons duly discriminate cancer from fungus hæmatodes, in which the operation mostly fails, the knife is less likely, than formerly, to be employed in hopeless examples, and fewer relapses will ensue.

When the operation answers, and the cure is complete, the patient can seldom wear an artificial eye, on account of the manner, in which both the eyelids shrink to the upper and lower margin of the orbit, and he is generally obliged to be content with wearing a compress, or a pair of spectacles, in which there is a piece of glass somewhat opaque, in order to conceal the disfigurement.

When a fungous malignant excrescence grows from the cornea, there is no occasion to extirpate the whole eye. According to Richter, it will be quite enough to cut away the anterior portion of the organ, as the base of the fungus seldom extends beyond the edge of the cornea. The operation may be effected by making a puncture in the eye with a lancet, a little way behind the margin of the cornea, and then carrying the wound all round the fungus with a pair of scissars. This being done, the coats of the eye, at the circumference of the incision, must be examined, and if diseased, they must be carefully removed. *

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[*] Richter's Anfansgr. der Wundarzn. band. iii. p. 422.

[†] Mohrenheim, Beobachtungen, band. ii.

[‡] Ware, in Trans. of Med. Society of London, vol. i. p. 152.

[§] Sabatier in speaking of M. Louis's mode of extirpating the eye remarks: "J'ai assisté à quelques unes de ses opérations, qui ont été faites avec beaucoup d'adresse et de facilité. Il pourroit cependant se faire que l'extirpation de l'œil ne reussit pas. On sait, en effet, avec quelle fureur le cancer, se reproduit quelquefois. Louis l'a eprouvé dans un cas, où il avoit fait son possible pour extirper, celui dont l'œil étoit affecté, en emportant, cautérisant, et brûlant les callosités à mesure qu'elles se présentoient. Le mal est revenu, comme il arrive en d'autres parties du corps." De la Médécine Opératoire, tom. iii. p. 58.

CHAP. XXII.

FUNGUS HÆMATODES OF THE EYE.

THE best informed surgeons scarcely know what forms of disease should alone be called cancer of the eye. We here meet with no distempers, which exhibit the peculiar scirrhous structure, that is so generally allowed to be characteristic of carcinomatous disease; yet, this organ is frequently attacked with certain diseases, which in point of malignity, and incurability, are not less dreadful than the cancer of other parts of the body, and have usually gone under the same appellation. Some of these disorders have been noticed in the preceding chapter. It remains for me to describe another important disease that has been long remarked by surgical practitioners; though, until lately, always classed by them with cancers, and very imperfectly explained.

It now appears that the disorder, to which I refer, instead of being allied to cancer, partakes of the same nature, as the equally peculiar affection, called fungus hæmatodes, to which, as I have related in the first part of this work, many structures are liable, some of which have never been known to be the seat of true carcinoma.

The second and twelfth chapters of Mr. Wardrop's publication † appear to me highly valuable; the one as containing a clear description of the fungus hæmatodes of the eye, a case which previously had not been distinctly explained; the other, as furnishing us with an excellent comparative view of this disease and cancer.

According to this gentleman, the first appearances of a fungus hæmatodes of the eye are in the posterior chamber. The pupil becomes dilated, of a dark amber, or greenish hue, in-

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[*] Anfansgr. der Wundarzn. band. iii. p. 425.

[†] See Obs. on Fungus Hæmatodes, or Soft Cancer, 1809.

stead of its natural deep black colour, and iris immoveable. Mr. Ware states, however, that the first symptom is a white shining substance in the posterior part of the eye, visible through the pupil in some particular positions of the head; but not in all *; an appearance compared to that of burnished iron. † As the disease advances, this deviation from the natural appearance of the pupil is discovered to be produced by a solid substance, which is formed at the bottom of the eye, and gradually approaches the cornea. At length, the excrescence occupies the whole interior of the eye behind the iris, and appears through the pupil to be of an amber or brown colour. In this stage of the disease, Mr. Wardrop has known two cases, which were mistaken for cataracts, and in one of them an experienced surgeon actually attempted ‡ couching. Fungus hæmatodes of the eye, even at its commencement, says Mr. Ware, bears a slight resemblance to a cataract; but an attentive person will at once discover the difference between the two disorders; the opacity of the cataract lying close behind the pupil, whilst in the fungus hæmatodes, it is deeply situated in the posterior part of the eye. In the cataract, also, the pupil retains the power of dilating and contracting in different degrees of light; but in the fungus hæmatodes the pupil never varies its size, and is usually dilated. §

When the disease advances still further, the form of the eyeball begins to alter, acquiring an irregular knobby appearance; and at the same time, the sclerotic coat loses its natural pearly white colour, and becomes of a dark blue, or livid colour. The tumour, by its continued growth, finally occupies the whole anterior chamber; and in some cases a quantity of purulent matter collects between the diseased mass and the cornea.

At last, the cornea ulcerates, and a fungous tumour shoots out, or else the excrescence makes its way through the sclerotic coat, and is then covered with the conjunctiva.

The protruded fungus is generally rapid in its growth, often attains a large size, is of a dark red, or purple colour, has an irregular surface, and is frequently covered with coagulated blood. It bleeds profusely from the slightest causes, and when it is large, its most prominent parts are apt to slough.

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* Trans. of the Med. Society of London, vol. i. p. 141.

† Scarpa on Diseases of the Eye, p. 505.; Transl. by Briggs, edit. 2.

‡ Op. cit. p. 11.

§ Trans. of the Med. Society, loco cit.

In the course of the disease, the absorbent glands, about the parotid gland, and lower jaw, become affected, sometimes attaining an enormous size.

On dissection, the retina is mostly found quite annihilated, the diseased mass extending forwards from the entrance of the optic nerve. Sometimes the tumour pushes before it the choroid coat, and ultimately occasions its total absorption; while, in other instances, this membrane remains in its natural situation, having no apparent connection with the disease. The morbid growth itself has a medullary or brainlike appearance, its consistence and colour, however, being subject to some variety.

Although the nerves in other parts of the body, where the fungus hæmatodes is met with, may not present the same morbid appearances, Scarpa entertains no doubt, that, with respect to the eye, the optic nerve and retina are the structures which are constantly first attacked. *

In some cases, the optic nerve becomes thicker, firmer, and harder, than common, assumes a brownish ash-colour, and loses its natural tubular appearance. Sometimes, it is converted into a tumour, of the figure and size of an olive, the disorganized substance of which exactly resembles that of the fungus, which fills the orbit, and projects beyond the † eyelids. In other instances, the nerve, besides being altered in its structure, is split into one or more pieces, the morbid growth filling up the intervening spaces, and surrounding the different portions of the nerve. The divided parts of the nerve are entirely deprived of their proper structure and colour.

Among many other particulars, Mr. Wardrop mentions, that when the optic nerve is diseased, the alteration in its structure generally extends as far up as its junction with the opposite nerve. In many cases, it extends further, the thalamus being converted into an irregular, soft pulpy mass, more or less blended with blood. Sometimes, the dura mater and pericranium exhibit dark red-coloured spots; and, on other occasions, the tunica arachnoides and pia mater are studded with numerous white spots, which, on being cut into, are found to be small bags, or abscesses containing a white viscid fluid, like cream.

It appears, that children are far more subject, than adults, to fungus hæmatodes of the eye; for out of 24 cases, with which Mr. Wardrop has been acquainted, 20 have been in

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* Scarpa on Diseases of the Eyes, p. 509.

† Scarpa op. et loc. cit.

children under 12 years of age. Bichat informs us, that more than a third of the patients, on whom Desault operated for carcinoma of the eye, were under the same early age; and this circumstance is not surprising, when we reflect, that this eminent surgeon did not discriminate fungus hæmatodes from cancer. The truth is, the latter distemper mostly afflicts persons advanced in years; while the former prevails most frequently in children; a circumstance strongly proving the dissimilarity of the two affections.

According to the observations of Mr. Wardrop, when the fungus hæmatodes takes place in children, they generally lose the sight of the affected eye, before the disease is at all noticed by the parents. In many cases, however, the appearance of the diseased substance at the bottom of the eye is preceded by a blow and inflammation of the organ. But when no external violence is concerned, the first perceptible symptom is merely a little fulness of the vessels of the white of the eye. Sometimes, the iris is full of vessels, its colour changes, and the pupil is considerably dilated and motionless. The child seldom complains of much pain; but sometimes appears languid and feverish.

In adults, the disease generally begins without any apparent cause; though, sometimes, it seems to arise in consequence of a blow. As in children, it commences with a slight redness of the conjunctiva, and an impairment of vision. These symptoms increase slowly, and at length are followed by headaches, which often become exceedingly agonizing, especially during the night, and continue with violence, until the eye bursts, and the humours are discharged.

In most cases, only one eye has been affected with the disease. In some examples, however, the distemper extends to both. *

As surgeons are utterly unacquainted with any internal or external medicines, which have the power of checking or curing the fungus hæmatodes of the eye; and as it is the nature of the disease to extend its ravages till the patient is destroyed; the only chance of preservation depends upon the early extirpation of the affected eye, care being also taken to remove every part in the orbit having any appearance of participating in the distemper. Hitherto, however, the disease has mostly recurred after the operation, and ultimately proved fatal. Such practitioners, indeed, as know how soon the dis-

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* See Med. Obs. and Inquiries, vol. iii. p. 155—157. Saunders on Diseases of the Eye, p. 121.

order generally spreads along the optic nerve, must already be prepared for this unfortunate truth. But, as we are not informed of any means by which the patient can possibly be saved, except the operation, this is not to be abandoned. In surgery, as in every thing else, desperate circumstances always justify desperate expedients; and how small soever the chance of success may be, if it is the only one, it ought not to be lost. The nature of the present disease makes the necessity for an early performance of the operation extremely pressing; for it has been proved, that in the commencement of the affection, it is not every instance which is attended with a morbid change of the optic nerve *, whatever may happen with regard to the retina. Still the prognosis cannot but be unfavourable, both because we know of only few examples, in which a cure has appeared to be at all permanent †, and because fungus hæmatodes seems frequently to be a distemper of the system, and to affect many different parts together. Hence, Scarpa affirms, that the extirpation of the eye, even in the first stage of the disease, is as unsuccessful as when the fungus has forced its way out. Nor, says he, is there as yet, in all the annals of surgery, a well attested instance of the success of the operation. ‡

CHAP. XXIII.

GUTTA SERENA, OR AMAUROSIS.

A BLINDNESS, depending on a paralytic affection of the retina and optic nerve, is so named. The disease is either *complete*, or *incomplete*, *inveterate*, or *recent*; *continued*, or *periodical.* Almost all the symptoms are of an equivocal nature, that is to say, such as may deceive a surgeon, who is not well versed in the subject. In many cases, the pupil is dilated, of its natural black colour and transparency, and the iris motionless. But, sometimes, in the most complete and incurable gutta serena, the pupil is of its natural size, and in a few instances, the iris is even capable of motion. * Occasionally, instead of being dilated, the pupil is exceedingly contracted. The pupil of an eye, affected with this malady, seldom exhibits the clear shining blackness, which is seen in a healthy state of this organ; for the most part, this aperture has a dull, glassy, or horny appearance. Sometimes its colour is greenish. In some instances it seems whitish and opaque, so as to be mistaken for an incipient cataract. The white appearance in the pupil generally arises from a reflection of light from the retina, in consequence of this membrane having become thickened and lost its natural transparency. Hence, Scarpa sets down this symptom as a very unfavourable omen.

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* See some cases quoted by Wardrop, op. cit. p. 28.

† In Mr. Wardrop's work, p. 81., a case is related, where the patient had had no relapse ten months after the operation. Mr. Hey has also mentioned an instance, in which the disease had not recurred, five months after its extirpation. See Pract. Observations in Surgery, p. 290. edit. 2.

‡ Scarpa, op. cit. p. 509.

Richter mentions a certain obliquity of sight, a circumstance long ago particularly adverted to by Mr. Hey †, as the only symptom invariably connected with amaurosis.

In particular cases, the paralysis is not confined to the retina and iris, but extends also to the eyelids.

The blindness, produced by the gutta serena, is generally preceded by an appearance of numerous insects, or substances like pieces of cobwebs, interposing themselves between the objects and the eye. The origin of a cataract, on the other hand, is usually attended with a simple cloudiness in vision.

As Beer has observed, the various cases of gutta serena all admit of being comprised in two classes; one attended with a diminution, in the irritability of the whole eye, and where the patient constantly seeks a strong and brilliant light; the other characterized by great tenderness and irritability of the organ, and an aversion to every light which is bright or vivid. ‡

As Scarpa observes, the *complete inveterate amaurosis*, with organic injury of the substance, constituting the immediate organ of sight, is a disease absolutely incurable. The *incomplete recent amaurosis*, particularly that which is periodical, is ordinarily incurable; for it is mostly sympathetic with the stomach and primæ viæ, or dependent on causes which, though they affect the immediate organ of sight, are capable of being dispersed, without leaving any vestige of impaired organization in the optic nerve or retina.

When amaurosis has prevailed several years, in persons of advanced age, whose eyesight has been weak from their youth;

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* See Richter's Anfansgr. der Wandarzneykunst, band. iii. p. 424. Janin, Mémoires sur l'Oeil, p. 426., and Schmucker's Vermischte Chirurgische Schriften, band. ii. p. 13.

† In Med. Obs. and Inquiries, vol. v.

‡ Lehre von den Augenkrankheiten, b 2.

when it has come on slowly; at first, with a morbid increase of sensibility in the immediate organ of sight, then with a gradual diminution of sensation in this organ, to the state of utter blindness; when the pupil is motionless, and has lost its circular shape, without being very much dilated; when this aperture is dilated in such a degree, that the iris seems as if it were wanting, and its margin is irregular and fringed; and when the bottom of the eye, independently of any opacity of the crystalline, presents an unusual paleness, like that of horn, or else a greenish hue; the malady may generally be considered incurable. Those cases may also be deemed irremediable which are attended with universal headache, and a constant sense of tension in the eyeball; which are preceded by a violent, protracted excitement of the whole nervous system, then by general debility, and languor of the whole constitution. There is no remedy for such cases as are preceded or accompanied by epileptic fits, or frequent hemicrania; nor for such as are the consequence of severe, obstinate, internal ophthalmies. We may also set down those cases as incurable, which, besides being of long standing, have originated from violent concussions of the head, or blows on the eyeball. The same may be said of amaurosis, when it arises from a violent contusion, or laceration of the supra-orbitary nerve *; when it proceeds from the entrance of foreign bodies into the eyeball; when it is attended with exostoses on the forehead, sides of the nose, or os maxillare; and when conjoined with a manifest change in the figure and dimensions of the whole eyeball.

On the contrary, all cases of *incomplete recent amaurosis* are mostly curable when not produced by any causes capable of contusing, or destroying, the organic texture of the optic nerve and retina, and when the immediate organ of sight retains some sensibility to the impression of light. Recent and sudden cases †, in which the pupil is not excessively dilated, and in which the disk of this aperture retains its regularity, while behind it the bottom of the eye is of a deep black colour; cases which are not accompanied by any acute and continual pain in the head and eyebrow, nor by any sense of constriction in the eyeball; cases which originate from violent emotions of the mind; excessive fulness of the stomach; irritating matter in this viscus; plethora; suppression of some habitual evacuation; great loss of blood; nervous debility, of not an inveterate nature, in young subjects; are all, generally speaking, curable. Amaurosis is also remediable, when it comes on during convulsions; the efforts of difficult parturition; towards the termination of acute, or intermittent fevers; and when it partakes of a periodical nature, having regular intervals of subsidence. *

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* Scarpa informs us, that out of many cases of this kind, he is only acquainted with one instance, in which a cure was effected. It is an example related by Valsalva in his Diss. 2. § 11. Mr. Hey, however, has recorded another example. See Medical Observations and Inquiries, vol. v.

† Schmucker remarks, that though the complete amaurosis is mostly a gradual disease, it sometimes comes on quite suddenly. This distinguished surgeon affirms, that he has often seen such cases, and constantly found them more easy of cure, than when the access of the disease has been more gradual. See Vermischte Chirurgische Schriften, band. ii.

TREATMENT OF GUTTA SERENA.

The most consummate continental surgeons all agree, that this disease, in its curable and incomplete state, commonly depends on a morbid irritation in the digestive organs, sometimes complicated with general nervous debility, in which the eyes participate.

Hence, the chief indications in the majority of recent, incomplete cases, is to empty the stomach and bowels; then to strengthen the tone of the digestive organs, together with that of the whole nervous system; while at the same time efforts are made to invigorate the action of the nerves of the eye in particular.

In the early part of the treatment, emetics and internal resolvents completely answer the purpose. Three grains of the antim. tart. (for an adult) are to be dissolved in four ounces of water, and two spoonsful of this mixture are to be administered every half hour, until nausea, succeeded by copious vomiting, is produced. On the following day, Scarpa recommends the exhibition of resolvent powders, composed of an ounce of crystals of tartar, and a grain of the antim. tart., divided into six equal parts, one of which is to be taken in the morning, another four hours afterwards, and a third in the evening, for eight or ten days in succession. These powders will create a little nausea, a few more alvine evacuations than usual, and, perhaps, in the course of a few days, vomiting.

If, during the use of these resolvent powders, the patient should make vain efforts to vomit, should complain of bitterness in his mouth, loss of appetite, and no melioration of his sight, an emetic must be repeated. The latter medicine is to be given a third, and even a fourth time, should the presence

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* See Scarpa's Saggio di Osservaz. sulle Malattie degli Occhi, cap. 19.

of irritating matter in the gastric system, the bitter taste in the mouth, the tension of the hypochondria, the acid eructations, and the inclination to vomit, make it necessary. For, as Scarpa remarks, the first emetic often only produces an evacuation of an aqueous fluid, blended with a little mucus; but if it be repeated a few days after the resolvent powders have been administered, it occasións a discharge of a considerable quantity of yellow greenish matter, with great relief to the stomach, head, and eyes.

This part of the treatment having been strictly put in practice, Schmucker's *, or Richter's †, resolvent pills are to be ordered. Under this plan, the patient sometimes begins to perceive the outlines of objects the very day on which he takes the emetic; at other times, he does not reap this benefit till the fifth, seventh, or tenth day; and in some instances, not before some weeks have elapsed after the exhibition of the emetic, and the uninterrupted use of the resolvent powders and pills.

As soon as the state of the digestive organs has been improved in this manner, the surgeon is to prescribe a powder composed of ℥j of bark, and ℥ss. of valerian, divided into six equal parts, one of which is to be taken, in any convenient vehicle, every morning and evening. These powders are to be continued at least five or six weeks. The diet must consist of nourishing and easily digestible food, with a moderate quantity of wine, and the patient should have, if possible, very good air, and take proper exercise.

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* ℞ Gum. sagapan,
Galban. } āā ʒi.
Sap. venet.
Rhei opt. ʒiss.
Antim. tart. gr. xvj.
Suc. liq. ʒj — fiant pilulæ gran. quinque.

Three of these pills to be taken every morning and evening, for a month or six weeks.

† ℞ Gum. ammon.
Ass. fœtid.
Sap. venet. } sing. ʒij.
Rad valer. s. p.
Summit. arnieæ
Antim. tart. gr. xviij. — fiant pil. gran. quinque.

Six to be taken thrice a day for several weeks. I have directed the pills to be made larger, than the foreign surgeons prescribe, as it would seem almost ridiculous in this country to order fifteen pills to be taken, two or three times a day, as Richter and Schmucker do on the continent; although it is proper to mention, that medical practitioners abroad reckon it advantageous to make the pills very small, in order that they may have a larger surface exposed to the action of the stomach and bowels.

In order to excite the languid nerves of the eye, Scarpa directs the vapour of the aqua ammoniæ puræ to be applied to the organ, till a copious secretion of tears and redness are brought on; then the practitioner is to desist a little; but he must renew the application in this manner three or four times at once, and persevere till the amaurosis is cured.

The action of the ammoniacal vapours may be aided by other external stimulants, applied to such parts of the body as have a great deal of sympathy with the eyes. Blisters to the nape of the neck; frictions, with liniments on the eyebrow; sternutatories; and electricity; are the chief auxiliary means.

The periodical amaurosis does not derive benefit from bark, as might be expected, unless emetic and resolvent medicines be previously exhibited.

There are cases of incomplete amaurosis, in the formation of which other causes operate, besides the most frequent one already stated: these examples demand the employment of particular curative means. Such is the instance which takes place suddenly, in consequence of the body being excessively heated; exposure to the sun; and violent anger in plethoric subjects. This case requires, above all things, general and topical bleedings, and the application of cold washes to the eye and whole head. Then an emetic should be given, and the patient purged with kali tartariz., or small repeated doses of antim. tartariz.

In the amaurosis, arising from the suppression of the menses, the first evident indication is to re-establish the evacuation of blood from the uterus. Scarpa directs leeches to the labia pudend., and bathing the feet in warm water. Then an emetic, and the above resolvent pills. If these remedies fail, this eminent practitioner speaks, with great confidence, of a stream of electricity, conducted from the loins across the pelvis, and thence repeatedly to the thighs and feet.

The amaurosis, which is induced by grief, or fright, may be cured, if we are to believe the observations of the experienced Schmucker, by first exhibiting tartar emetic, then the resolvent pills, and, lastly, bark and valerian. *

In such cases, as seem to depend upon nervous debility of the eye, or constitution at large, and are sometimes brought on by immoderate study by candle light, Scarpa recommends the treatment to begin with small divided doses of the tincture

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* See Vermischte Chirurgische Schriften Von Johann. Leberecht Schmucker, band. ii.

of rhubarb, for the purpose of emptying the primæ viæ. Cordial and tonic medicines are afterwards to be exhibited; and, lastly, the decoction of bark, with valerian, or the infusion of quassia with a few drops of the vitriolic æther to each dose. Nutritious food is to be allowed, and the patient is to avoid, as much as possible, straining his eyes, and every thing that troubles his mind. He is to walk or ride out in fine weather, and bathe in the sea in the summer. The vapour of the spir. ammon. comp.* is to be applied to the eye itself, three or four times a day, or if this application should not be strong enough, the vapour of the aqua ammoniæ puræ may be employed. When the sight improves, the eye is always to be protected from the effect of too vivid light by plain green glasses.

Various sternutatories, or snuffs, have gained repute for their efficacy in cases of amaurosis. Schmucker has employed, for this purpose, a powder composed of a scruple of betony, and two grains of hydrargyrus sulphuratus; or else one consisting of a dram of quicksilver, three drams of white sugar, one of white lilies, and one of valerian, all well blended together. The late Mr. Ware, whose experience was also favourable to the trial of sternutatories, recommended ten grains of the hydrargyrus sulphuratus, mixed with a dram of common sugar.

Mercurial frictions are not unfrequently tried for the cure of amaurosis, and sometimes with decided benefit. A blister may at the same time be put on the nape of the neck, and be kept open with the savine cerate.

Mr. Hey, one of the most able and candid practical surgeons of the present day, has proved, by a series of facts, the great efficacy of electricity in relieving certain cases of the present affliction. He first placed his patients on the electrical stool, and drew sparks from the affected eye. This plan was after a little while repeated. Slight shocks were afterwards directed, from the occiput towards the eyebrow and forehead. In conjunction with this means, bleeding was practised, if deemed necessary, and the following medicine was sometimes given at night: ℞ hydrarg. submur. camphoræ ā ā gr. iij. conserv. rosæ q. s. ft. bolus.†

In consequence of the submuriate of mercury having been given in these examples, Scarpa seems inclined to impute most of the benefit to it; but it is to be observed, that Mr. Hey did not always prescribe medicine, and yet the electricity succeeded. However, Mr. Ware and several other gentlemen have now added the weight of their testimony, in support of the frequent good effects of electricity on amaurosis, so that this point can no longer be a matter of controversy.* In this country, the treatment with tartarized antimony, as practised on the continent, has not proved so effectual as it has done abroad; a fact, which makes it probable, that the cases, which we usually meet with, are not altogether dependent upon that disordered state of the abdominal viscera, on which Scarpa, Schmucker, Richter, and Beer have so particularly dwelt.

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* This is nearly the same thing as what Scarpa calls the aromatic spirituous vapour.

† See Medical Obs. and Inquiries, vol. v.

CHAP. XXIV.

CATARACT.

WHEN the crystalline lens, or its capsule, is affected with opacity, the species of blindness, thence resulting, is denominated a *cataract.* The opacity originates, for the most part, gradually, and augments in the same manner. Sometimes, however, it makes its appearance suddenly, and in a very high degree. The first effect of an incipient opacity is a mist before the eyes, surrounding every object, and afterwards gradually increasing so much in density, as to render things quite invisible. The opacity, behind the pupil, increases in proportion as the cloudiness in vision augments. As the lens is thick at its centre, and thin at its edge, the incipient opacity, when viewed externally, always seems the greatest in the middle of the pupil; while the circumference of the lens appears like a black ring, surrounding the white nucleus of the crystalline. Some rays of light are capable of penetrating the thin margin of the lens in its most opaque state; and hence, patients with cataracts are almost always able to distinguish light from darkness, and, in the early stage of the complaint, discern objects best when these are a little on one side of the axis of vision, and not immediately opposite the eye. Hence, such patients also see better in a moderate, than a brilliant light, which makes the iris contract over the thin circumference of the lens.

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* "Vestuleis rapporte la guérison d'une amaurose de quatre ans, qui a été ainsi guérie. Floyer vante également ses succés sur ce point, dans une lettre écrite an Docteur But. M. de la Sausure a également réussi sur une femme, par des commotions convenablement ménagées." See Encyclopédie Methodique, Partie Chir. Art. Amaurose.

When the opaque lens is either more indurated than in the natural state, or retains a moderate degree of consistence, the case is termed a *firm* or *hard cataract*. Mr. Pott has explained, in his usual elegant style, that an opaque lens is very rarely firmer than, or even so firm as, a healthy one; and both this eminent surgeon and Richter make it appear probable, that the harder a cataract is, the thinner and smaller it becomes. The latter states, that a *firm* cataract usually presents either an ash-coloured, a yellow, or a brownish appearance. The interspace between the cataract and pupil is very considerable. The patient very distinctly discerns the light, and can even plainly perceive large bright objects. In the dilated state of the pupil, a black circle, surrounding the lens, is very perceptible. The motions of the pupil are free and prompt; and the anterior surface of the cataract appears flat, without the least degree of convexity.

When the substance of the lens seems to be converted into a whitish, or other kind of fluid, lodged in the capsule, the case is denominated a *milky*, or *fluid cataract*. According to Richter, this species of the complaint has usually a white appearance, while irregular spots and streaks, different in colour from the rest of the cataract, are often observable on it. These are apt to change their figure and situation, when frequent and sudden motions of the eyes occur, or when these organs are rubbed or pressed. The lower half of the pupil seems more opaque, than the upper; and the crystalline lens, as it loses its firmness, commonly acquires an augmented size. Hence, the fluid cataract is thick, and the opacity close behind the pupil. Sometimes one can perceive no space between the cataract and margin of the lens. In advanced cases, the pupil is in general extremely dilated, and the iris moves very slowly and inertly, in consequence of the cataract touching this membrane, and impeding its action. Patients, who have milky cataracts, usually distinguish light from darkness very indistinctly, and sometimes not at all; partly because the cataract, when bulky, lies so closely to the iris, that few or no rays of light can enter between them into the eye; and partly, because the fluid cataract always assumes a globular form, and, consequently, has no thin edge, through which the rays of light can penetrate.

When the opaque lens is of a middling consistence, neither hard, nor fluid, but about as consistent as a thick jelly, or curds, the case is termed a *soft*, or *caseous cataract*.

As the lens softens in this manner, it commonly grows thicker and larger, even acquiring a much greater size, than that of the fluid cataract. Hence, this species of the disease impedes the motion of the pupil even more considerably than the latter sort of case.

The only other variety of the disease, necessary to be noticed in this work, is the *secondary membranous cataract*, which is an opacity of the anterior or posterior layer of the crystalline capsule, taking place after the lens itself has been removed from this little membranous sac by a preceding operation.

All cataracts may be complicated with other diseases of the eyes, chronic ophthalmy, lippitudo, amaurosis, adhesion of the opaque lens to the iris, &c.

A species of amaurosis, sometimes accompanying a cataract, is described as being very rapid in its progress, and producing blindness in the course of a few days. The pupil is dilated, the lens protrudes, the convex iris seems to touch the cornea, the humours of the eye are turbid and dim, and the vessels of the conjunctiva and sclerotica are unnaturally large, and run in distinct clusters. The disease remains stationary, and incurable, with occasional pains of the eye, or head.

A less advanced state of the disorder may be ascertained, by the pupil being somewhat dilated and still, or else sluggishly contracting over a yellowish lens, even in a strong light, while there is a tendency in the vessels on the anterior part of the globe to assume a fascicular arrangement.

Another more common form of amaurosis is also mentioned, in which the pupil is not only motionless, or nearly so, but is also contracted and irregular. This disease is slower in its progress than the preceding case, and generally incurable.[*]

Though persons above the age of forty are reckoned more liable to cataracts than younger ones, the disease is by no means unfrequent in the latter; even children are often seen affected with this kind of blindness, and, as I shall hereafter have occasion to notice more particularly, some are born with it. Persons exposed to strong fires, as blacksmiths, glassmen, &c. are more subject to this affliction, than the generality of mankind. But commonly, a cataract seems to rise spontaneously, without any assignable cause. In a few instances, external violence occasions the opacity of the lens; a case which more frequently than any other gets well without an operation.

Many internal medicines have been exhibited with a view of dispersing opacities of the crystalline lens. None seem to have obtained the confidence of experienced men. The remedies which the late Mr. Ware found more effectual than others, were the application of one or two drops of æther to the eye itself, once or twice a day, and the occasional rubbing of the eye, over the lid, with the point of the finger, first moistened with a weak volatile or mercurial liniment.

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[*] See Saunders's Treatise on Diseases of the Eye, chap. v.

Some little attention is requisite to distinguish the cases of cataract, which afford a reasonable prospect of benefit from an operation.

There is always reason to expect success, when, in the incipient state of the disease, the patient discerned objects, as it were, through a mist, which, increasing in density, at length became a complete impediment to vision; when the opacity of the crystalline lens supervened gradually, unpreceded, and unaccompanied by internal ophthalmy; when no particular headache, nor pains in the eye and eyebrow have been experienced; when the pupil preserves its circular figure, and the faculty of varying its dimensions in the different degrees of light; when the patient can distinguish light from darkness; and, especially, when in a moderate light, where the pupil is usually not too much contracted, he is able to discern bright colours, and the outlines of objects.

A case answering this description is the most favourable one; but almost any case, unattended with gutta serena, may derive benefit from an operation, and no serious harm can ever result from the attempt.

Cataracts are usually cured, either by removing the opaque lens from the axis of vision by means of a needle, or by extracting the lens from the eye, through a semicircular incision made at the lower part of the cornea. The first operation is termed couching, or depression of the cataract; the second is named extraction. To these two methods is now to be added the mode of operating devised, and practised with vast success, by the late Mr. Saunders, and which chiefly consists in lacerating the central part of the front layer of the capsule, without moving the lens at all out of its situation. *

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* The essential part of this third operation, as far as art is concerned, being that of making a proper aperture in the capsule, it may be said, according to Dr. Farre, to be *an operation on the capsule*, in contradistinction to extraction and depression, which imply principally the removal of the lens from its seat, p. 161. Besides the above-mentioned plans of operating, some others have been suggested, as, for instance, that of introducing the needle through the cornea, an operation of real merit, and termed *keratonyxis;* the method of extracting the lens through an incision in the sclerotica, as proposed by Dr. Löbenstein Löbel; and, lastly,

COUCHING, OR DEPRESSION OF THE CATARACT.

A skilful operator may employ, I think, with nearly equal advantage, a common slender spear-shaped needle; the delicate curved needle employed by Professor Scarpa *; or that used by Mr. Hey. † When, however, the entire aim in the operation is merely slightly to disturb and gently break the opaque lens, so as to produce its absorption, the small fine needle, employed by Mr. Saunders, deserves recommendation. ‡ If the curved couching needle be made use of, it is to be held with the convexity of its curvature forward, its point backward, and its handle parallel to the patient's temple. The surgeon, having directed the patient to turn the eye towards the nose, is to introduce the instrument boldly through the sclerotic coat, at the distance of not less than two lines from the margin of the cornea, in order to avoid the ciliary processes.

The exact place, to which the point of the needle should next be guided, is between the cataract and ciliary processes, in front of the opaque lens and its capsule; but, as the attempt to hit this delicate invisible mark borders upon impossibility, and may even endanger the iris, it seems safer to direct the extremity of the instrument immediately over the opaque lens, and, in the first instance, to depress it a little downward with the convex flat surface of the end of the needle. Thus room is made for the safe conveyance of the instrument between the cataract and ciliary processes, in front of the diseased crystalline and its capsule. Care must be taken, in this latter step of the operation, to keep the marked side of the handle forward, so as to have the point of the instrument turned away from the iris. The needle will now be visible in the pupil, and its point is to be pushed in a transverse direction as far as the inner edge of the lens. Then the operator is to incline the handle of the instrument towards himself, by which means its point will be directed through the capsule into the substance of the opaque lens, and on in-

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the complicated proceeding of first pushing the lens into the anterior chamber, with a needle introduced through the sclerotica, and then extracting the opaque body through an incision practised in the cornea, as recommended by Sir W. Adams, who, previously to the operation, produces a dilatation of the iris with the extract of belladonna.

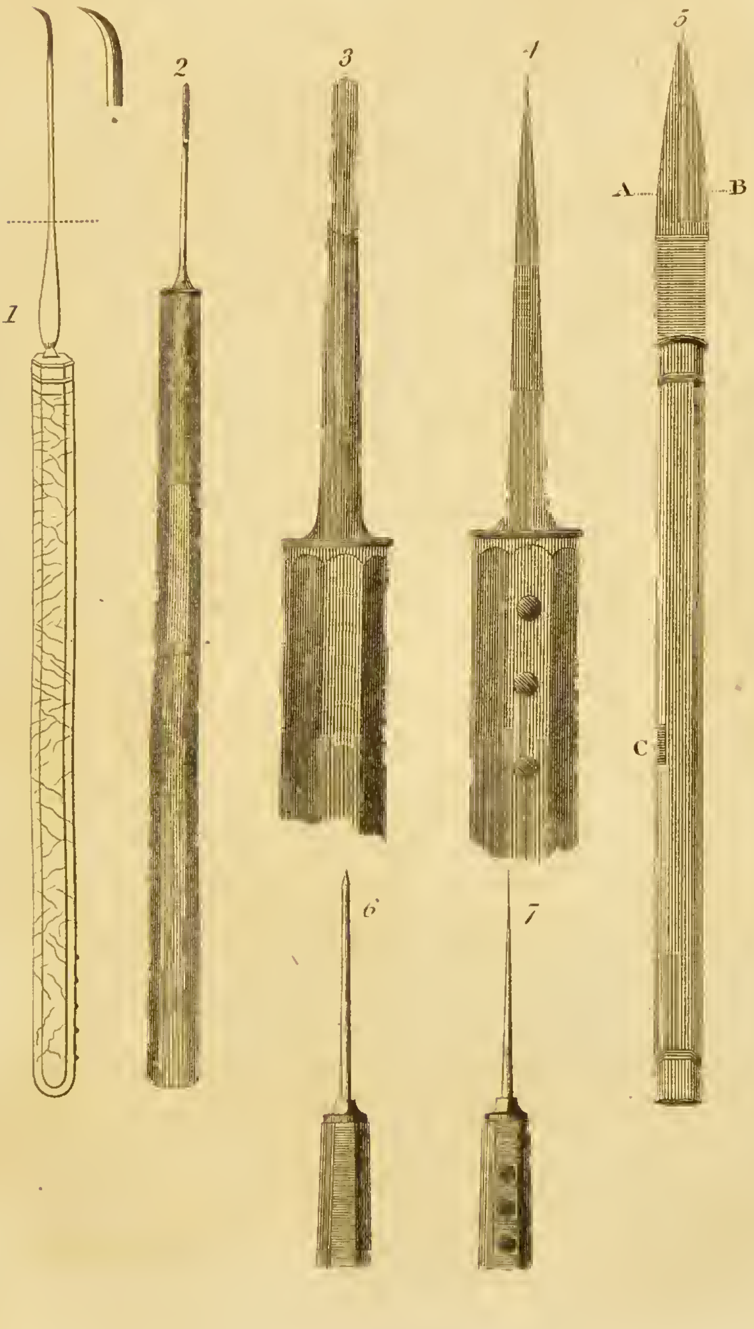
[*] See Plate VIII. fig. 1. The part between the handle and the dotted line may be advantageously deducted from its length.

[†] See Plate VIII. figs. 2, 3, 4. The two last are magnified views.

[‡] Plate VIII. fig. 6. and 7.

Plate VIII

Wenzel's knife for the Extraction of the Cataract & Scarpa's, Hey, and Saunders's Needles for Couching.



Published March 24.1819 by Longman & C.º Paternoster Row, London.

Cooper sculp!

clining the needle downward and backward, the former will be lacerated, and conveyed, with the latter, deeply into the vitreous humour.

It is deemed of great importance to lacerate the front layer of the capsule in the operation; because this plan renders the subsequent absorption of the opaque lens more certain and quick, and the occurrence of a secondary membranous cataract almost impossible.

Such is Scarpa's excellent plan of operating for a *firm* cataract.

When the case is a *fluid* or *milky* one, the contents of the capsule flow out as soon as the little membranous sac is pierced with the needle, and they sometimes completely conceal the iris, the pupil, and the instrument from the operator's view. The object now is to lacerate the capsule as much as possible. Both the fragments and the extravasation of the milky fluid in the two chambers of the aqueous humour are gradually absorbed after the operation, so as to leave the eye in a transparent state.

When the cataract is *soft*, the particles, of which it is composed, will frequently elude all efforts made with the needle to depress them. This, however, is quite unnecessary. The operator may either be content with a free laceration, and disturbance of them, or he may imitate Scarpa in pushing the fragments of the capsule, and the particles of caseous matter, into the anterior chamber, where absorption is observed to be carried on with more vigour, than behind the pupil.

When the case is a *secondary membranous* cataract, the surgeon is to turn the point of the needle cautiously towards the pupil, and pierce the opaque capsule. This is to be broken, as far as it is practicable, at every point of its circumference, and the fragments may either be left in their situation, or pushed forward through the pupil into the anterior chamber, in the way which Scarpa practises.

When the capsule is adherent to the iris, it may often be separated by skilful and delicate movements of the needle.

If the operator should prefer the straight needle, he must be careful to depress the cataract a little in the first instance, before making any attempt to place the instrument in front of the cataract, in order to be able to depress it downward and backward, in the most convenient manner. As the point of a curved needle is turned backward, it may evidently be brought forward with more safety than a straight one, which has a tendency to run directly against the iris. Whenever an operator prefers lacerating the front layer of the capsule, and pushing the particles of soft and membranous cataracts forward, he will accomplish his objects with far greater safety by means of Scarpa's needle, than it is possible to effect with a straight one, *provided he is well acquainted with the anatomy of the eye, the scientific mode of using the instrument, and has a tolerably steady hand, and a good eye of his own.*

EXTRACTION OF THE CATARACT.

Baron Wenzel's knife for dividing the cornea is represented, plate VIII., fig. 5. A, the back of the blade; B, its edge; C, a mark on the handle to distinguish the back from the edge of the blade. The late Mr. Ware employed a knife, which bore a great resemblance to Wenzel's, and chiefly differed from it in being less spear-pointed. The lower edge of Wenzel's knife is sharp throughout its whole length; but the upper edge, though thin, is not sharp, except to the extent of one-eighth of an inch from the point. Every knife, designed for dividing the cornea, should be so constructed as to increase gradually in thickness from the point to the handle; by which means, as Mr. Ware has observed, the aqueous humour will be prevented from escaping before the section is begun downwards. When the aqueous humour escapes prematurely, the iris falls forward beneath the edge of the knife, and is apt to be wounded. The instrument should, therefore, be so contrived, that not a particle of this fluid can escape from the eye before the lower part of the cornea is completely divided. Perhaps, the very best kind of knife for the extraction of the cataract is that recommended, and used with unparalleled success, by Professor Beer, of Vienna. *

The patient is to sit in a low chair, and not in too strong a light, as this makes the pupil contract too much. The sound eye is to be covered with a compress. Both these directions are equally applicable to couching. An assistant is gently to raise the upper eyelid with his fore and middle fingers, and he is to press the tarsus against the upper edge of the orbit. The operator should be seated a little higher than the patient, resting his right foot on a stool, in order that his knee may be raised high enough to support the elbow. The knife is to be held like a writing pen, and the little finger of the hand is to rest steadily on the outside of the cheek.

When the eye is still, and so turned towards the outer angle that the inner and inferior part of the cornea can be distinctly seen, the operator is to plunge the knife into the upper and outer part of this tunic, at the distance of a quarter of a line from the sclerotica, and a little above the transverse diameter of the cornea.

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* See Plate VII. fig. 3.

Baron Wenzel objected to making the least pressure on the eye. The late Mr. Ware, however, so often perceived the ill effects of leaving the eye unfixed at the time of making the incision through the cornea, that he used to prefer the plan of employing pressure just at the instant when the knife is carried across the cornea, taking care to remove it before any attempt is made to divide this tunic downward. The first process of the incision Mr. Ware called *punctuation;* the second, *section* of the cornea. He directs the operator to place the fore and middle finger of the hand not used in holding the knife upon the tunica conjunctiva, just below and a little on the inside of the cornea. At the same time, the assistant is to apply one, or if the eye projects sufficiently, two of his fingers upon the conjunctiva, a little on the inside of and above the cornea. The fingers of the operator and assistant, thus opposed to each other, will fix the eye, and prevent the lids from closing. The knife is to be pushed through the cornea slowly and steadily, without the least intermission. When about one-third of the blade of Mr. Ware's knife has emerged from the inner part of the cornea, near its margin, the punctuation is completed. The broad part of the blade is now between the cornea and iris, and its edge below the pupil; so that the latter membrane is then, according to Mr. Ware, out of all danger of being wounded. Every degree of pressure must now be taken off the globe of the eye, and consequently the fingers, both of the operator and his assistant, are instantly to be removed from this part, and applied only against the eyelids.

The blade of the knife is now to be pressed slowly downward, till it has cut its way out, and divided a little more than half of the circle of the cornea.

Though Mr. Ware considers the iris out of danger as soon as the knife has completed what he terms *punctuation,* the authority of Richter, who has had immense experience in this branch of surgery, might be adduced to prove the contrary; and that if the aqueous humour be allowed to escape before the edge of the knife has begun to divide the lower laminæ of the cornea, the iris is still apt to fall forward and be cut. Hence, the author of the present volume requests the reader to be very particular in employing a knife which will regularly, as it is introduced, fill the wound; which has a blade broad enough to divide the lower part of the cornea before its point has approached too near the nose; and, lastly, which will affect this object by being merely pressed in a transverse direction, and without any previous escape of the aqueous humour.

The incision of the cornea being accomplished, the next object is to divide the anterior layer of the capsule of the crystalline lens, in order to allow the opaque lens itself to escape. Wenzel, who, no doubt, was a man of uncommon dexterity, used to puncture the capsule with the point of the knife, at the same time that he was dividing the cornea. Mr. Ware very properly discouraged this method, by stating that it was rather a work of dexterity than usefulness, and was often attended with much hazard of wounding the iris. Even the adroit Baron himself found it necessary, in particular cases, to divide the cornea first, and then open the capsule with a gold needle, made for the purpose.

In general, the exit of the opaque lens very readily follows the division of its capsule, as soon as gentle pressure is made on the eye. If any fragments of opaque matter remain behind, they are usually taken away by an instrument resembling a minute spoon, termed a *curette.*

A very small pair of forceps is commonly employed for extracting the capsule itself, when deprived of its natural transparency.

OF THE CONGENITAL CATARACT.

It will be universally acknowledged, that the merit of the late Mr. Saunders stands exceedingly high. The boldness, judgment, and skill, with which he effected the cure of cataracts, even in infants of tender years, those cases, which custom and prejudice had set down as altogether untractable; and the novelty, ingenuity, tenderness, and unparalleled success of his manner of operating; entitle him to a conspicuous place among the modern improvers of surgery. Many thanks seem also due to Dr. Farre, who has supplied the profession with numerous interesting particulars relative to Mr. Saunders's opinions and practice, in cases of cataract; a task which could only be performed by one who was at once the intimate friend and colleague of the deceased. It is from Dr. Farre's account that I have collected the few annexed observations; and, conscious that my limits have not allowed me to do justice to so interesting a subject, I should feel deficient in duty, were I to neglect recommending surgeons not to be content with my imperfect detail; but to have recourse to the treatise, of which Dr. Farre is the editor, and which may be considered as the fountain-head of information.

In the majority of cases of congenital cataract, after the lens has been converted into an opaque substance, it is gradually absorbed; and in proportion as such absorption proceeds, the anterior and posterior layers of the capsule become approximated, and at length form one membrane, which is white, opaque, and very elastic. Among the exceptions to this order of events, is to be noticed a form of the congenital cataract, in which the centre of the lens is opaque, while the circumference is perfectly transparent. In such a case, the lens remains of its natural size, as long as its circumference preserves its transparency; but, as soon as the capsule and lens are penetrated, even with the finest instrument, the opacity spreads with rapidity. From this period, the bulk of the lens is diminished, with more or less celerity, according to the manner in which the wound has been made.

Congenital cataracts not only frequently attack children of the same parents; but, in this circumstance, are often precisely of a resembling consistence and nature. The lens may be either solid, soft, or fluid; but more commonly it is partially, or completely absorbed, and the cataract is capsular. Children, thus affected, possess various degrees of vision. Some see external objects indistinctly; others can discern only bright colours, or vivid lights. If the blindness be nearly complete, as the eyes are not attracted by any external objects, volition is not exercised over their muscles, their actions are not associated, and they roll about with rapidity, and tremble as they move.

In operating upon infants, Mr. Saunders used to overcome every difficulty by fixing the eyeball with Pellier's elevator; controlling the little patients by force; dilating the pupil with the belladonna; and employing a slender needle, armed with a cutting edge from its shoulders to its point, and thin enough to penetrate with the utmost ease. *

The extract of belladonna, diluted with water to the consistence of cream, was dropped into the eye; or, to avoid irritation, the extract itself was smeared over the eyelid and eyebrow. In about half an hour, and seldom later than an hour, the pupil is fully dilated, and the application must then be washed from the appendages of the eye. The child is now to be put on a table, parallel to a window, from which the eye, about to be operated upon, is farthest. Four assistants, and when the child is stout, five are required to confine it. The surgeon is to sit upon a high chair behind the patient, with Pellier's elevator in his left hand, and Mr. Saunders's needle in his right, if it be the right eye, on which the operation is to be done; or with the first instrument in his right hand, and

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* See Plate VIII. fig. 6. and 7.

the second in his left, if the operation is to be performed on the left eye.

Here it is necessary to state, that Mr. Saunders used to practise two operations; one is called *anterior*, in which the needle is introduced into the eye in front of the iris[*]; the other, *posterior*, the needle being introduced behind the latter membrane.

When the capsule contained an opaque lens, Mr. Saunders used gently to introduce the bow of Pellier's elevator under the upper eyelid, while an assistant depressed the lower one. At the moment, when he was about to pierce the cornea, he fixed the eye by making moderate pressure on it with the elevator. Such pressure was immediately discontinued, when it was no longer absolutely needed. Mr. Saunders used to pierce the cornea, as near its junction with the sclerotica as would allow the flat surface of the needle to pass, in a direction parallel and close to the iris, without injuring this membrane. When the point of the needle had arrived at the centre of the dilated pupil, Mr. Saunders did not boldly plunge it through the capsule into the lens, nor perform any depressing motion. It was a material object with him, not to injure the vitreous humour, nor its capsule. Neither did he draw the capsule of the lens, with the point of the needle, towards the pupil; for it was an important part of his plan to avoid displacing the lens. On the contrary, he proceeded with a gentle lateral motion, working, with the point and shoulders of the needle, only on the surface and centre of the capsule, to an extent, that did not exceed the natural size of the pupil. His purpose was to accomplish a *permanent* destruction of this central portion of the capsule, and a simple puncture of it would not have answered the design. His next proceeding was to sink the needle gently into the body of the lens, and moderately open its texture.[†]

Any inflammatory symptoms after the operation were opposed by the application of leeches, or even general bleeding. The extract of belladonna was also applied to the eyebrow, in order to keep the pupil dilated, and its edge out of danger of becoming adherent to the wounded capsule.

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[*] A method of operating usually termed on the continent *keratonyxis.*

[†] The following method, occasionally practised by Pott, has a considerable resemblance to Mr. Saunders's operation: "I have sometimes (says the former), when I have found the cataract to be of the mixed kind, not attempted depression; but have contented myself with a free laceration of the capsule; and having turned the needle round and round between my finger and thumb, within the body of the crystalline, have left all the parts in their natural situation: in which cases, I have hardly ever known them fail of dissolving so entirely as not to leave the smallest vestige of a cataract." Pott's Chirurgical Works, vol. iii. p. 156. edit. by Earle, 1808.

A single operation sometimes sufficed, nature producing a dissolution and absorption of the opaque lens. On other occasions, one or more repetitions were necessary, an interval of at least a fortnight being always suffered to elapse between every two operations.

Fluid cataracts of the congenital kind are the least common, and when these cases are met with, the surgeon, after puncturing the capsule, and letting its contents mix with the aqueous humour, is to do no more for the present, but take the requisite steps for averting inflammation. The case is thus changed into a capsular cataract.

When the capsule was opaque, the lens having been nearly, or quite absorbed, the practice of Mr. Saunders authorised a freer employment of the needle; though in the manner already detailed. When any portion of the lens remained, as a small nucleus in the centre of the capsule, his efforts were exclusively directed to the detachment of this portion, in order to effect a permanent aperture in the centre of the capsule. When this membrane alone presented itself, his main plan was to form an opening in the middle of it.

When Mr. Saunders practised his posterior operation, *for a capsule containing an opaque lens*, he introduced the needle, in the common way, through the sclerotica. He then gently depressed its handle, so as to direct its point towards the capsule, through the thin edge of the lens; and pushing the flat surface of the instrument between the capsule and the lens, he carried it as far as the centre of that membrane. Here he opened the capsule, taking care not to tear it extensively, lest he should dislocate the lens. He then cautiously opened the texture of the lens, and withdrew the needle. In repeating the operation, his aim was to complete the central opening in the capsule, and loosen the texture of the lens. Small flocculi, he allowed to fall into the anterior chamber; but he endeavoured to avoid forcing large fragments into it.

When the posterior operation was done, and the case was *an opaque capsule, the lens having been nearly, or quite absorbed*, the needle was introduced in a direction obliquely backward, in order to avoid the iris, which, in consequence of the absorption of the lens, was liable to be situated further backward. Any remnant of the lens was first detached; and then the same manœuvres were adopted, as in the anterior operation on capsular cases. The capsule was often so yielding, that a backward or depressing motion of the needle was sometimes necessary to rend its centre.

It appears, that Mr. Saunders finally gave a preference to the anterior operation, which inflicted slighter injury on the eye, did not disturb the ciliary processes, nor vitreous humour, and excited less inflammation.

The success of this gentleman's practice may be conceived, when it is known, that, of sixty patients, he restored fifty-two to sight by his mode of operating. He operated both on infants and adults. It is observed, also, that his attempts were most successful in children, between the ages of eighteen months and four years.

Among the arguments mentioned in favour of operating early, two in particular merit attention. First; we are told, that, in cases in which the patient has no perception of external objects, the muscles acquire so inveterate a habit of rolling the eye, that, for a very long time after the pupil has been cleared by an operation, no voluntary effort can control this irregular motion, nor direct the eye to objects, with sufficient precision for the purpose of distinct and useful vision. Secondly, the retina, when not exercised for a long while, is apt to lose a degree of its sensibility.*

CHAP. XXV.

RANULA.

THE ranula is so common a disease, that every practitioner must have had opportunities of seeing it. It may be defined to be a tumour, arising from a distension of the salivary ducts underneath the tongue, and from an accumulation of the saliva in the dilated part. The cause of the disorder is probably owing to an obstruction of the excretory duct either of the sublingual, or of the inferior maxillary gland.

Such authors as have made mention of ranulæ, before the organs serving for the secretion of the saliva were known, can have had no precise ideas concerning the nature of the disease. Munnicks, who possessed a considerable share of modern anatomical knowledge, seems to have been the earliest author who understood the true character of the * complaint.

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* See a Treatise on some Practical Points relating to the Diseases of the Eye, by the late J. C. Saunders; to which is added, His Method of Curing the Congenital Cataract, by J. R. Farre, M.D. 1811. Of this work, there have now been three editions.

The swelling is usually situated on one side of the frænum linguæ, and particularly when it is large, sometimes extends under the apex of the tongue. The tumour consists of a sac, which is composed of the dilated portion of the duct, and is either filled with clear fluid, a purulent matter, or an earthy substance. Unless the tumour has been of long standing, its contents bear a perfect resemblance in colour and consistence to the white of egg. When the disease is less recent, the matter is thicker, and it may become like plaster, or even acquire a calcareous hardness. † Its size varies considerably in different cases, from that of a pea to that of a hen's egg. In some instances, it becomes exceedingly large, elevating the tongue so much, that deglutition and respiration are greatly obstructed, and the pressure may even thrust out the teeth, and render the lower jaw-bone carious. ‡ Some swellings of this kind have been known to contain a pint of matter.

The shape of ranulæ is subject to variety: some are round; others are oblong §; and occasionally the sac has elongations extending a considerable way backwards under the tongue.

Ranulæ are frequently quite free from pain; but, in some instances they are very painful, especially when the tongue is moved; and in others, they are more or less in an inflamed state.

Encysted tumours are liable to form under the tongue, and cannot easily be distinguished from ranulæ. Indeed, I think, we must agree with Richter, that, in many cases, where ranulæ are reported to have contained a caseous, fatty, or pultaceous substance, the diseases must in reality have been encysted swellings. ‖ However, as in both instances much the same kind of treatment is proper, mistaking one kind of tumour for the other is not of any material importance.

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* Prax. Chir. lib. i. cap. 26. Celsus is supposed to have alluded to ranulæ in the 12th chap. of the 7th book, entitled, "De Abscessu sub linguâ."

† M. Louis, in Mém. de l'Acad. de Chirurgie, tom. ix. p. 95. edit. 12mo.

‡ See a case recorded by M. Boinet, in Mém. de l'Acad. de Chir. tom. xiv. p. 258. edit. 12mo.

§ "On reconnoit, deux especes de grenoüillettes; les unes rondes, placées sous la langue, semblent n' être produites que par la dilatation du canal excrétoire de la glande sublinguale; les autres sont plus longues que rondes, placées à la partie latérale de la langue, et formées par la dilatation du canal excrétoire de la glande maxillaire inférieure." See M. de la Faye's Notes on Dionis.

‖ Richter's Anfansgr. der Wundarzneykunst, band. iv. p. 4. edit. 2.

When ranulæ have become as large as a walnut, they sometimes burst spontaneously, and a cure may be the consequence; though in general the opening is not large enough; or calcareous matter exists in the sac, and the cure is incomplete.

TREATMENT.

From what has been stated, it might be inferred, that the cysts of these swellings ought to be dissected out, in the same manner as those of ordinary encysted tumours. Owing to the particularity of the situation of ranulæ, this is not exactly the case. If the surgeon were to endeavour to take out the whole sac, he could hardly avoid wounding the raninal artery, the hemorrhage from which might prove excessively troublesome, and even fatal.

Practitioners in this country are, in general, content with laying open the tumour from one end to the other; squeezing out its contents; and removing every particle of calcareous matter, that can be felt within the wound. Foreign surgeons, after opening the tumour in this manner, very frequently cut away the whole anterior portion of the sac with scissars, and even attempt the destruction of the rest by applying caustics to it.

Cutting away a portion of the sac is, perhaps, the surest mode of cure; for when a mere incision is too small, or closes prematurely, the disease generally recurs.* After making a free opening into the swelling with a knife, the surgeon can easily cut off a part of the edges of the incision, either with the same instrument, and a pair of forceps, or with a pair of scissars, as he may prefer.

It was in this manner, that my friend Mr. Lawrence lately treated, with perfect success, an enormous ranula, which formed a large prominent swelling, extending from the symphysis to the angle of the jaw.

When the substance of a tumour beneath the tongue is fat, as soon as the surgeon has ascertained the nature of the case by an incision, his best plan is to take hold of the swelling with a hook, draw it forward, and carefully take it out, by detaching it from the surrounding parts in front with a bistoury; and breaking the connection, on the side towards the raninal artery, with his fingers. This may be safely and easily done.

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* "J'en ai ouvert plusieurs; et il est presque toujours arrivé, lorsque l'incision n'avoit pas été assez étendue, que les levres de la plaie se réunissoient; et la tumeur se reprodnisoit quelque tems après." Louis, in Mém. de l'Acad. de Chirurgie, tom. ix. p. 96. edit. 12mo.

If there should be much bleeding, after either of the operations above mentioned, it may be stopped by pressing some lint into the wound. When this plan does not answer, the patient must first wash his mouth with brandy, and then press a dossil of lint on the part again.

No dressings can be conveniently kept on the wound; and the surgeon need only cause the part to be frequently washed, by means of a syringe.

Sometimes, when there is no evident swelling, calcareous concretions form in the salivary ducts, and may excite pain and uneasiness under the tongue. In some instances, the calculus projects from the orifice of one of the ducts into the mouth, and admits of being drawn out with a pair of forceps. In others, it is necessary to make an incision, for the purpose of extracting the extraneous substance.

The French surgeons, Desault and Chopart, have proposed introducing a small probe into the obstructed orifice of the salivary duct, in cases of ranulæ, with a view of rendering the tube pervious again, and thus curing the disease. This plan can only be expected to succeed in very recent cases; and the introduction of an instrument into the duct, when closed, is by no means an easy matter.

CHAP. XXVI.

DIVISION OF THE FRÆNUM LINGUÆ.

A PRETERNATURAL confinement of the apex of the tongue may arise from two causes; viz. the frænum may extend too far forward, to the very extreme point of this organ; or it may not be of sufficient length to allow the tongue to be duly elevated from the bottom of the mouth. The first malformation is the most common; but both kinds impede the motion of the tip of the tongue, prevent children from sucking, and cause an incapacity of articulating sounds in a proper manner. Hence, the frænum linguæ of persons born dumb should always be examined. As this defect in the formation of the frænum is supposed by the generality of persons to be an exceedingly common one, and the operation for its relief is not totally exempt from danger, it is highly necessary for every surgeon to know, that in infants an incapacity to suck, in consequence of the evidently immoveable state of the tongue, caused by the above defects, forms the only just ground for dividing the frænum.

Hence, before performing an operation, the surgeon should not be satisfied with merely hearing, that a child cannot suck; as this incapacity may be owing to other causes, particularly the large size of the nurse's nipple, adhesions of the sides of the tongue to the inside of the mouth, &c. The practitioner ought to examine with his eyes, whether the frænum extends to the apex of the tongue in an undue manner: a thing most easily ascertained, as in the natural state, about a quarter of an inch of the under surface of the tongue, from the apex backward, remains quite unconnected with the frænum. When this part ties the tongue too closely to the bottom of the mouth, by reason of its shortness, the surgeon cannot raise the tongue towards the palate even with his own fingers.

The operation consists in dividing the frænum, as far as seems necessary; and it is so simple, as to require no particular explanation. The best instrument for performing it is a pair of sharp scissars with blunt points. No more of the frænum ought to be divided than is essential to the object in view; and pointed instruments should never be employed. The situation of the raninal arteries renders this caution of the highest importance; for many children have lost their lives from these vessels having been unskilfully wounded by careless or ignorant operators.

Before the time of M. J. L. Petit, some bad consequences, apt to be produced by the operation of dividing the frænum linguæ, had been little taken notice of by surgical authors. This eminent surgeon, however, had been impressed by experience with the knowledge of these dangers, of which he drew up an interesting and instructive account. * One of the perils alluded to, is the suffocation of the infant by the tongue turning backwards. Another is an hemorrhage, which occasionally follows the operation.

The frænum serves to confine the tongue, and keep it from being thrown too far backward in the action of deglutition. Now, in the operation treated of above, if an unnecessary incision, or one that is too extensive, be made, the tongue may be carried beyond the narrow part of the throat, and so engaged in the opening of the pharynx, as not to admit of being brought back again into its natural situation. The first opportunity, which Petit had of observing this event, was in a child, that had died about five hours after its frænum linguæ

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* Mémoires de l'Acad. des Sciences, pour 1742.

had been divided, and whose body this distinguished practitioner was requested to examine. Upon passing a finger into the child's mouth, he was surprised at not being able to feel the tongue, and at perceiving, that the posterior opening of the mouth was completely stopped up by a fleshy substance. As soon as an incision was made through the cheek, it became evident, that this substance was the tongue itself, which had been thrown into the upper part of the pharynx in the effort of swallowing.

When Petit was sent for to another infant, which had fallen into a state approaching to suffocation, about two hours after its frænum linguæ had been cut, he immediately tried to ascertain the cause of the occurrence. When he introduced his finger into the child's mouth, he found that the tongue was half displaced backward. There was no difficulty in reducing it; but the accident recurred several times in the course of the day. Petit conceived, that it was now necessary to have recourse to some mechanical means for the prevention of future displacement. This purpose was fulfilled by means of a thick compress, which was placed on the tongue, and retained with tape applied round the lower jaw. Whenever the infant had occasion to suck, the apparatus was taken off, and put on again immediately afterwards. The little patient was sent into the country, however, where the plan was neglected, and the child was seized with symptoms of suffocation and died.

Subsequently to this case, Petit met with other examples, in which children, affected in a similar way, were saved by a perseverance in the method that he has proposed.

The second dangerous consequence, occasionally resulting from the operation of dividing the frænum linguæ, is an hemorrhage which takes place when one of the raninal arteries or veins is wounded. This accident has long been well known, and all writers who have treated of the operation in question, have not failed to notice it. Petit, however, saw the same perilous occurrence take place, even when the large vessels of the tongue were uninjured, and of course the bleeding proceeded entirely from such small vessels as are distributed to the membrane of the frænum itself. The blood, which escapes from them, and collects in the mouth, induces the infant to make continual endeavours to suck, by which means, the bleeding is kept up, until extreme or even fatal weakness is brought on. As the child keeps swallowing the blood, as fast as it oozes into the mouth, it is possible for the bleeding never to be suspected, until all hopes of recovery are past. Dionis mentions a case, in which the stomach of an infant, that had died a few hours after the operation, was found filled with blood, which had been recently swallowed. But, in regard to the hemorrhage from the small vessels of the frænum, the accident to which I am now more particularly adverting, it deserves attention, that Petit met with several examples of it. In these cases, unavailing attempts were made to stop the bleeding with astringent applications, and badly contrived compresses. Hence, Petit was led to invent, for the stoppage of the hemorrhage, an apparatus, that is at once simple, ingenious, and effectual. The surgeon is to get a piece of birch, and cut it through below the place where two branches of equal size unite. It is to be made to resemble a sort of fork, the prongs of which are to be about eight lines long, and the handle four. It is then to be covered all over with linen, and put under the tongue, in such a way, that the end of the handle is to rest against the middle of the concavity of the arch of the jaw, while the prongs embrace the frænum, and compress the bleeding vessels. The middle of a roller is next to be applied to the dorsum of the tongue, as far back as possible, and the ends, after crossing each other under the chin, are to be pinned to the child's nightcap. In this manner, the vessels are compressed, from below upward by the prongs of the wooden fork, while the bandage makes pressure from above downward. Thus the tongue is fixed, and the bleeding is effectually stopped. *

CHAP. XXVII.

INJURIES AND DISEASES OF THE TONGUE.

WOUNDS.

WOUNDS of the tongue may be divided into longitudinal and transverse. The former rarely happen, and seldom demand any but ordinary treatment. The same may be said of punctured wounds of this organ; cases which are occasionally met with in practice.

The most frequent wounds of the tongue are those which are transverse. They are hardly ever produced by outward

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[*] See Sabatier's Médecine Opératoire, tom. iii.

means; but usually by the teeth, when the lower jaw is forcibly and spasmodically brought against the upper one, while the tongue is out of the mouth, as sometimes happens in epilepsy, and falls upon the chin. In this way, transverse wounds of considerable extent frequently happen, almost separating, in some instances, the apex from the body of the tongue. In such cases, the injury may easily be converted into a sort of cleft, which may remain for ever afterwards, and more or less impede the functions of the organ. This disagreeable consequence is more likely to happen when no care is taken to keep the opposite sides of the wound in proper contact, and hinder them from becoming distant from each other.

Hence, certain writers on surgery have recommended all wounds of the tongue to be immediately closed with a suture; and Richter, though by no means a constant advocate for this method, is candid enough to allow, that it has succeeded in the best manner, even in cases where the tongue was nearly bitten through. *

The application of a suture to the tongue being attended with some pain and difficulty, a very simple bandage has been proposed for uniting transverse wounds of this part.† Richter maintains, however, that the invention referred to, does not answer expectation. The main portion of it is a little sort of bag, in which the fore part of the tongue is confined. Thus all motions of this organ forwards, or laterally, may be effectually prevented, but the patient is not deprived of the power of drawing it backward, that very action, which has a direct tendency to make the sides of a transverse wound separate from each other. In some cases, indeed, as Richter observes, the apparatus seems rather to do harm. Children, to whom it proves exceedingly irksome, are made restless by it, so that they keep moving their tongue and jaw about, to the great irritation and disturbance of the wound.

Richter further objects to Pibrac's bandage, that it is decidedly unnecessary, for such motions of the tongue as it directly restrains, namely, those forwards, or to either side, may be hindered by applying a bandage to the jaw, and making the patient refrain from talking and mastication. The same author affirms, that such treatment has answered as well as could be desired, in numerous cases, some of which were large transverse wounds in restless and unmanageable

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* Richter's Anfansgr. der Wundarzn. band. iii. p. 24.

† Pibrac, Mém. de l'Acad. de Chirurg. tom. ix. p. 22. pl. 9. — Le Blanc, Precis d'Opérations.

children. During the treatment, however, the patient is to be allowed only liquid nourishment, which must be imbibed through a tube.

Perhaps, however, on the whole, the propriety of employing a suture must depend entirely on considerations of the following kind. When the transverse wound is deep, and extends quite across the dorsum of the tongue; when it is situated towards the apex, and is conveniently within reach; and when the patient is uncontrollable, and cannot be made to keep the tongue and lower jaw quiet, a suture may be advantageous. On the other hand, when the wound is at the back part of the tongue, (a case by the by that is unfrequent,) and a suture must be difficult of application; when the wound is trivial, likely to heal of itself, and there is no risk of its occasioning any material cleft in the part; and when the patient is docile and attentive to the advice given him; the most judicious practice is to apply such a bandage, as is recommended for the fractured jaw, and to forbid all motion of the tongue and lower jaw, by speaking, masticating, &c. nothing but liquid food being allowed to be drunk through a tube.

If the wound should be so deep as almost to separate the anterior part of the tongue from the rest of this organ, the remaining connection is not to be divided, but an endeavour made to bring about an union. There are numerous cases on record, encouraging the practitioner to expect the best consequences from the attempt. *

With regard to other circumstances relating to wounds of the tongue, the treatment of these cases does not differ from that of wounds in general.

BLEEDING FROM THE TONGUE.

An hemorrhage from the raninal vessels sometimes follows accidental wounds, and surgical operations on the tongue. When it is an artery that bleeds, the accident may prove dangerous, and even fatal, especially in children, who by moving the tongue and jaw about, and continually sucking, promote the hemorrhage, and render the adoption of the measures necessary for its suppression extremely difficult. As in these cases a ligature, compression, and styptics, hardly admit of being applied, the bleeding cannot be stopped

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* Richter's Anfansgr. der Wundarzneykunst, band. iv. p. 26. edit. 2.

without much trouble. Whether the raninal arteries can be tied in a manner suggested in the latter part of this chapter remains to be proved, but certainly they are rather too far out of reach to be tied in the common way. Nor can compression, as ordinarily performed, be trusted, since it operates against soft yielding parts, and not upon any fixed point. Strong styptics, even were they deemed worthy of trial, could not well be employed, since they would be apt to mix with the saliva, and be swallowed. Yet there are some means by which the most perilous bleedings of this sort have been stopped.

Among the most celebrated of these last methods, is the actual cautery, which is preferred by several of the continental surgeons, and may, perhaps, in this solitary instance, seem almost justifiable to British surgeons, averse as they properly are to this barbarous practice.

Another plan is that of directing an assistant to keep a compress on the bleeding vessels, as long as necessary, with his finger, while with his thumb he takes care to make counter-pressure under the jaw. M. Jourdain stopped a considerable hemorrhage from the raninal vessels, by laying a piece of ice under the tongue. The ingenious contrivance of M. Petit for these cases I have already described in the foregoing chapter.

If a surgeon were to be averse to all these plans, or find them unavailing, there is yet one resource left, namely, that of cutting down to and tying the trunk of the lingual artery, just where it passes over the cornu of the os hyoides.

Hemorrhage from the raninal vessels occasionally arises, quite independently of a wound. In one such example, the bleeding proceeded from a varicose vessel under the tongue, and was effectually stopped with the cautery. *

DANGEROUS ENLARGEMENT OF THE TONGUE FROM INFLAMMATION.

Sometimes, when this organ is inflamed, it swells so prodigiously, that it protrudes between the teeth, entirely fills up the cavity of the mouth, and obstructs speech, deglutition, and even respiration. In such a case, the most prompt assistance is demanded. Ordinary evacuations of blood, and other antiphlogistic measures, here seldom bring relief with sufficient celerity. According to surgical authors, the most

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* See Desault's Journ. de Chirurgie.

certain plan consists in making two longitudinal cuts along the edges of the dorsum of the tongue, from one to two inches in length. A copious bleeding generally follows, which soon brings about a diminution of the swelling. No troublesome consequences are to be apprehended from such incisions, which heal with ease, and scarcely leave any scar behind. *

Jourdain † succeeded in affording prompt relief, by taking blood from one of the raninal veins. This method seems liable to no objection, except that of being perhaps difficult, when the tongue is enormously swelled.

In one example, the disease resisted every means, until a blister was applied to the throat. ‡

Some inflammations of the tongue have been observed to originate from the lodgment of foreign bodies in it, which ought to be extracted, as for instance, a fish-bone or a needle. § Other cases have arisen from the injudicious employment of mercury, and the excitement of a sudden and immoderate salivation. Many examples are connected with violent inflammation of the parts about the throat.

Sometimes inflammations of the tongue terminate in suppuration. Such abscesses rarely admit of being opened, and hardly allow the use of any means, except emollient gargles.

Cases have occurred, in which inflammation of the tongue has induced mortification, and the loss of the greater part of this organ. The treatment of such instances must conform to the general rules delivered in the chapter on mortification.

When, in consequence of any enlargement of the tongue, or other disease in the mouth, the necessary food and medicines are for a considerable time prevented from being taken, they may be injected into the stomach through an elastic catheter, which is to be passed through one of the nostrils down the œsophagus. It has been recommended to have the outer end of the instrument to turn upward out of the nostril, and shaped like a funnel, whereby fluids may be more conveniently introduced ‖; but I do not think this any material improvement, since all liquids may be easily injected with an elastic gum syringe, such as is used for injecting hydroceles, without

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* De la Malle, Mém. de l'Acad. de Chir. tom. v.

† Traité des Maladies de la Bouche, &c.

‡ Richter's Anfansgr. der Wundarzn. band. iv. p. 29.

§ Jourdain, Traité des Maladies de la Bouche, &c.

‖ Libouton, Journal de Médécine, tom. xxxiv.

having the external end of the catheter made in the manner above suggested.

ULCERS, INDURATIONS, AND TUMOURS OF THE TONGUE.

Ulcers on the tongue, of an exceedingly painful, obstinate, and malignant-looking nature, are sometimes produced by the sharp or rough edge of a tooth. This mechanical kind of cause is easily detected on examination with the finger. If the tooth be sound, the projection or roughness must be filed off*; if it be carious, the best plan is to extract it. When these objects are accomplished, the sore usually heals without further trouble.

Some very obstinate ulcers which originate on the tongue, and are connected with disorder of the digestive organs, may be cured by a long perseverance in the use of the antim. tart. exhibited alternately in small doses, and then in larger ones, so as to excite vomiting. This treatment may be followed by the exhibition of tonic medicines.

Ulcers, deserving the epithets *malignant* and *cancerous*, not unfrequently form on the tongue. Sometimes the malady, in its most incipient state, appears as a sore. Sometimes a circumscribed moveable or immoveable scirrhous swelling is first observable, which gradually becomes painful, and ulcerates. In other instances, there is in the beginning only an induration in the substance of the tongue, without the smallest appearance of any swelling. The ulcers under consideration are always surrounded by hardness. They may make their first appearance either at the edges or at the apex of the tongue. In certain cases, the whole, or a large portion of this organ, is covered with numerous small scirrhous tubercles, which gradually fall into a state of ulceration.† These I have seen greatly diminished by a gentle course of mercury. All the medicines tried in other cases of cancer, especially arsenic, conium, &c. may here be tried, but on the whole, the timely employment of the knife merits the most confidence.

However, the following kinds of cases have yielded to particular remedies.

A malignant exceedingly painful ulcer on the tongue, surrounded with a good deal of inflammatory hardness, has been cured by the continued internal use of opium. The dose is to be gradually augmented; patients are stated to have taken at last eighteen grains in one day.

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* Videndumque est, num contra dens aliquis acutior sit, qui sanescere sæpe ulcus eo loco non sinit, ideoque limandus est. Celsus, lib. 6. cap. 12.

† Richter's Anfansgr. der Wundarzneykunst, band. iv. p. 53.

One species of malignant ulcer yields to the long continued exhibition of tartar emetic. The doses must be increased in proportion to the time which elapses from the first taking of the medicine.*

Very malignant and unyielding sores on the tongue are said to have been cured by repeatedly applying leeches to the under-surface of this organ.†

It would be inexcusable to pass over in silence such ill-conditioned ulcers of the tongue as originate during violent salivations. Sometimes similar sores, produced by the same cause, take place at the same time on the tonsils, and in this circumstance, inexperienced surgeons, or mistaken practitioners, who are blinded with the fear of syphilis, are very apt to suppose the sores to be of a venereal character. This error leads to the freer use of mercury; the sores frequently slough, and the patient's health becoming greatly deranged, he is thrown into a state of imminent peril. In this case, it is hardly necessary to observe, that the use of mercury must be immediately omitted, and the mouth very frequently washed with a solution of alum.

Violent inflammations, followed by ulcerations of this sort, are particularly apt to occur, when patients, under the influence of mercury, catch cold.

For the removal of a cancerous portion of the tongue, a bistoury is the best instrument; and the patient's mouth should be kept open during the operation, by something interposed between the teeth. The hemorrhage is the circumstance most apprehended; but, we have instances related of large portions, and even the anterior half of the tongue being amputated, and of the bleeding being easily suppressed, either by the actual cautery, or some of the above named means for the suppression of hemorrhage.‡ I think a tolerably dexterous man might tie the mouth of an artery in this situation, with the assistance of two pair of forceps to draw the ends of the ligature, when the noose has been put over the tenaculum, round the bleeding point. Certainly, cancerous diseases of the tongue may have advanced to such a degree, that an operation cannot be prudently undertaken. The bleeding would be a serious objection; the whole distemper of the tongue itself might not be removeable; and the contaminated state of the adjacent lymphatic glands, below the jaw, usually existing in this advanced state of the malady, might also render a radical cure quite impracticable.

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* Idem, opere cit.

† Medical Communications, vol. ii.

‡ See Mém. Physiologique et Pathologique sur la Langue, par M. Louis, in Mém. de l'Acad. de Chirurgie, tom. xiv. edit. 12mo.; also Ruysch's Observ. Anat. Chir. obs. 76.

When the disease is not in the vicinity of the apex of the tongue, the operator may find it difficult to draw the part sufficiently forwards, and keep it in this position. In this circumstance, surgical authors recommend the employment of a pair of forceps for the purpose, the blades of which are to be covered with rag. Should this instrument be found ineffectual, they advise the surgeon to use a pair of forceps, the blades of which terminate in two short double hooks. As being painful, one should always avoid employing such an instrument, if there is a possibility of dispensing with it.

Here, as in all other cancerous cases, it is the duty of the surgeon to take care that no point, suspected of participating in the disease, be left behind. Unless this maxim be attended to, the operation will mostly be followed by a relapse.

Abroad, surgeons have sometimes effected a cure by applying the cautery, notwithstanding the wound after the operation had put on an unhealthy and fungous appearance.* In this country, practitioners might hope for similar success from the cautious employment of caustic; for the revival of the cautery, under any circumstances, is an idea now almost intolerable to every British practitioner.

After the excision of a diseased portion of the tongue, local applications cannot be very well used, nor are they in general necessary, when the patient moves the part as little as possible, and avoids putting stimulating food and liquids into his mouth.

Cancerous portions of the tongue may also be extirpated, by passing a double ligature through this organ, and firmly tying one part of the ligature over each side of it.

This plan must be infinitely more painful than the removal of the diseased part with a knife. To the latter method, the hemorrhage is the only objection, and, notwithstanding all that has been said, I think no surgeon ought to venture to cut away a diseased tongue, without having first made up his mind respecting what method should be adopted for stopping the bleeding.

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* Journ. de Médécine, tom. xviii.

When much of the tongue has been lost, there certainly is reason to expect that its functions will afterwards be performed in a very imperfect manner. However, there are on record several examples, in which the greater part of this organ was lost, and yet the patients retained the faculties of tasting, masticating, swallowing, and articulating words with considerable perfection. *

The removal of scirrhous and sarcomatous tumours of the tongue may be most conveniently accomplished with a scalpel and a tenaculum. Encysted swellings of this organ are generally of the meliceris kind, and ought, if possible, to be dissected out, without opening the cyst at all. †

Authors relate examples, in which the tongue has been of extraordinary magnitude, either in consequence of original malformation, or a peculiar sort of disease. Excepting the deformity arising from the projection of the part out of the mouth, some of these patients experienced no particular inconvenience, as they could speak, masticate, and swallow tolerably well. ‡ Under these circumstances, the removal of the redundant portion would not be advisable, but if the disfigurement were combined with much inconvenience, the operation would be proper, especially as the cut part would be so forward in the mouth that the bleeding vessels could be tied. §

CHAP. XXVIII.

DISEASES OF THE TONSILS AND UVULA.

THE tonsils are exceedingly liable to inflame, and sometimes the swelling thus produced is so great as to obstruct

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* See Mém. Physiologique, &c. sur la Langue par M. Louis, in Mém. de l'Acad. de Chirurgie, tom. xiv. edit. 12mo.

† Schmucker records the extirpation of a large encysted tumour of the tongue, in which case the appearance of the swelling had excited suspicions of the patient having two tongues. See Vermischte Chir. Schriften, band. iii. p. 322.

‡ Sandifort's Obs.

Richter's Anfansgr. der Wundarzneykunst, loco cit.

deglutition and respiration in a very dangerous degree. Prompt succour is now most urgently required, and relief may commonly be obtained by scarifying the enlarged tonsils, and promoting the bleeding with warm gargles.

This operation may be done with an ordinary lancet, or with a broad one contained in a sheath, and constructed so that its point can only be pushed out to a certain distance. *Pharyngotomus* is the name usually applied to this [*] instrument. Abscesses in the tonsils are also to be opened, when the swelling causes considerable inconvenience.

When scarifications cannot be adopted, the best means are venesection, applying leeches to the throat, exhibiting mercurial medicines, inhaling the steam of hot water, and using proper gargles.

Abscesses of the tonsils have been observed of considerable extent, not bursting in the mouth, as is usual, but in the Eustachian tube, or even the meatus auditorius externus, attended with caries of the mastoid process, deafness, and fistulæ. Such cases are frequently incurable. [†]

The tonsils sometimes become enlarged, without being inflamed. This swelling is improperly termed *scirrhus*. The glands are only swollen, and of moderate firmness. A portion of a tonsil thus enlarged may be cut off without the least danger of the rest assuming a malignant nature. This preternatural swelling of the tonsils is mostly owing to repeated inflammations. Sometimes there is no palpable cause. The malady is constantly free from pain. When the tumefaction is considerable, it obstructs the speech, deglutition, and respiration.

Discutient and astringent applications here prove ineffectual. The tumour admits of being removed, but it is unnecessary and improper to take away the whole tonsil, as a dangerous and even fatal hemorrhage might be the consequence. [‡] Only so much of the swelling should be removed as is sufficient to afford relief. The remaining portion in general heals without the least difficulty; a clear proof that the disease is not of a malignant, nor cancerous nature. [§]

The extirpation of a part of a tonsil, thus diseased, has been accomplished with caustics, the actual cautery, the ligature, and cutting instruments. The first of these plans was successfully practised by Wiseman, but is now quite abandoned. The second is also relinquished, as no modern surgeons employ it, except now and then, with a view of destroying fungous excrescences, which, in a few instances, originate after a part of the tumour has been removed by some other operation.

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[*] A representation of it may be seen in Heister's Institut. tab. 21. fig. 6.

[†] Petit, Traité des Maladies Chirurg.

[‡] Mr. Sharp states, that in the manner in which tonsils were formerly cut away, the almost constant consequence was a violent bleeding, and sometimes a mortal one. Op. of Surgery, chap. xxxii.

[§] Richter's Anfansgr. der Wundarzneykunst, band. iv. p. 46.

A variety of instruments have been devised for putting a ligature round diseased tonsils. *

There are very good surgeons who still prefer tying diseased tonsils to cutting them away, and the mode to be adopted differs according as the swelling has a narrow or broad base. The ligature ought to be made of silver wire or catgut. When the tumour has a narrow neck, the ligature is to be doubled, and introduced through the nostril, so that the noose may be seen in the throat. With the aid of a pair of forceps, the noose may then be easily placed round the neck of the tumour. The ends of the ligature are then to be brought through a double cannula, and the latter instrument introduced as far as the tonsil. The ligature on each side is then to be drawn tight, and fastened round rings at the end of the cannula. The instrument may next be twisted, till a due degree of constriction is produced.

Desault employed an instrument called a *serre-nœud*, for putting the noose of the ligature over a diseased tonsil, and producing the necessary degree of constriction. The *serre-nœud* was nothing more than a little ring, mounted on a longitudinal narrow piece of steel †, about five inches long, the other end of which was grooved, or rather forked. The diseased tonsil was first taken hold of with a double hook. With the ring, the noose was conducted along the hook, and put over the tonsil, the ligature was then drawn out, while the ring pressed the noose downward and backward. Thus the due constriction was made, and it was next maintained by twisting the ends of the ligature round the forked extremity of the instrument, on the outside of the mouth. ‡

When the disease had a broad base, and was of a conical shape, so that the ligature was apt to slip off, Cheselden has recommended the use of an instrument like a crooked needle, set in a handle, with an eye near the point, threaded with a ligature, which is to be thrust through the bottom of the gland, and laid hold of with a hook. The needle is then to be withdrawn. The double ligature is next to be brought forwards, and one part tied above, the other below the tumour. The ligatures are now to be cut off near the knots. *

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* See Sharp's Treatise of the Operations, tab. 12., Le Drans Operations of Surgery, tab. 9. p. 453.

† The first instrument of this kind appears to have been the invention of Mr. Cheselden, who was, in his time, the glory of English surgery.

‡ Œuvres de Desault par Bichat, tom. ii. p. 233.

I have already observed, that the removal of the whole enlarged tonsil is unnecessary, and therefore injudicious. I may now notice, that a *portion* of the tumour may be cut away, without any just ground for fearing a dangerous bleeding. The application of a ligature occasionally produces a most perilous swelling of the diseased tonsil, attended with such hazard of suffocation, as to compel the surgeon to cut and remove it. † Bertrandi ‡, and many other eminent surgeons, have been in the habit of cutting away enlarged tonsils, without ever meeting with an instance of danger from the subsequent bleeding.

Desault sometimes employed a flat sheath, made of silver, and having a notch in it for the reception of the base of the tonsil. The latter part being thus taken hold of, a spring was touched, when a concealed blade immediately moved across the notch, and made the requisite division, without any risk of injuring the adjacent parts in the mouth. §

The operation may be done with a pair of scissars, constructed with short blades and long handles; or it may be performed with a bistoury, which, in general, must be the best instrument.

The hemorrhage may usually be stopped by washing the mouth repeatedly with very cold water.

When the enlargement of the tonsil is really of a scirrhous nature, a case which is possible though not common, an operation performed so as to remove only a part of the indurated enlargement, would not be followed by success. ||

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* Sharp's Operations, chap. 32.

† See Obs. sur la Rescission des Amygdales tumefiés, par M. Moscati, in Mém. de l'Acad. de Chir. tom. xiv. p. 296. edit. in 12mo.

‡ "Je me suis convaincu, par ma propre expérience, qu'il est moins douloureux et beaucoup plus expéditif de les extirper avec le fer: je n'ai jamais vu arriver l'hémorrhagíe, dont quelques-uns paroissent avoir eu tant de peur." Traité des Operations de Chirurgie, chap. 18. p. 371.

§ Op. supra cit. p. 228.

|| There are some modern surgical writers, who deny altogether that the tonsils are ever in reality affected with scirrhus. "C'est à tort qu'on a donné le nom de squirres à ces obstructions muquenses des amygdales.

Calculous concretions have been known to form in the tonsils, and occasion troublesome coughing, sore throats, &c. The propriety of extracting them, when their existence is clearly ascertained, is almost too obvious to require being mentioned.

EXTIRPATION OF A PART OF THE UVULA.

When the uvula is permanently elongated, so as to interrupt swallowing, and occasion uneasiness in the throat, coughing, vomiting, &c. it is proper to remove the redundant part.

Slight relaxations of the uvula may generally be cured by astringent gargles, composed of the infusion of roses, alum, tincture of bark, &c. When the inconvenience is not removeable by such means, the superfluous portion of the uvula must be cut off with a pair of sharp scissars.* The fear of hemorrhage, and the recommendation of the ligature in these cases, still introduced in several modern surgical books, are almost absurd.

CHAP. XXIX.

WOUNDS OF THE THROAT AND NECK.

THERE are several anatomical points, which should be remembered by the surgeon in all cases of wounds about the throat. First, that the arch of the aorta lies in the upper part of the chest, in front of the trachea, and that where the carotid arteries come out of the chest to run up the neck, they are scarcely at the sides of the trachea, but rather in front of it. As they get higher, however, they incline more to the

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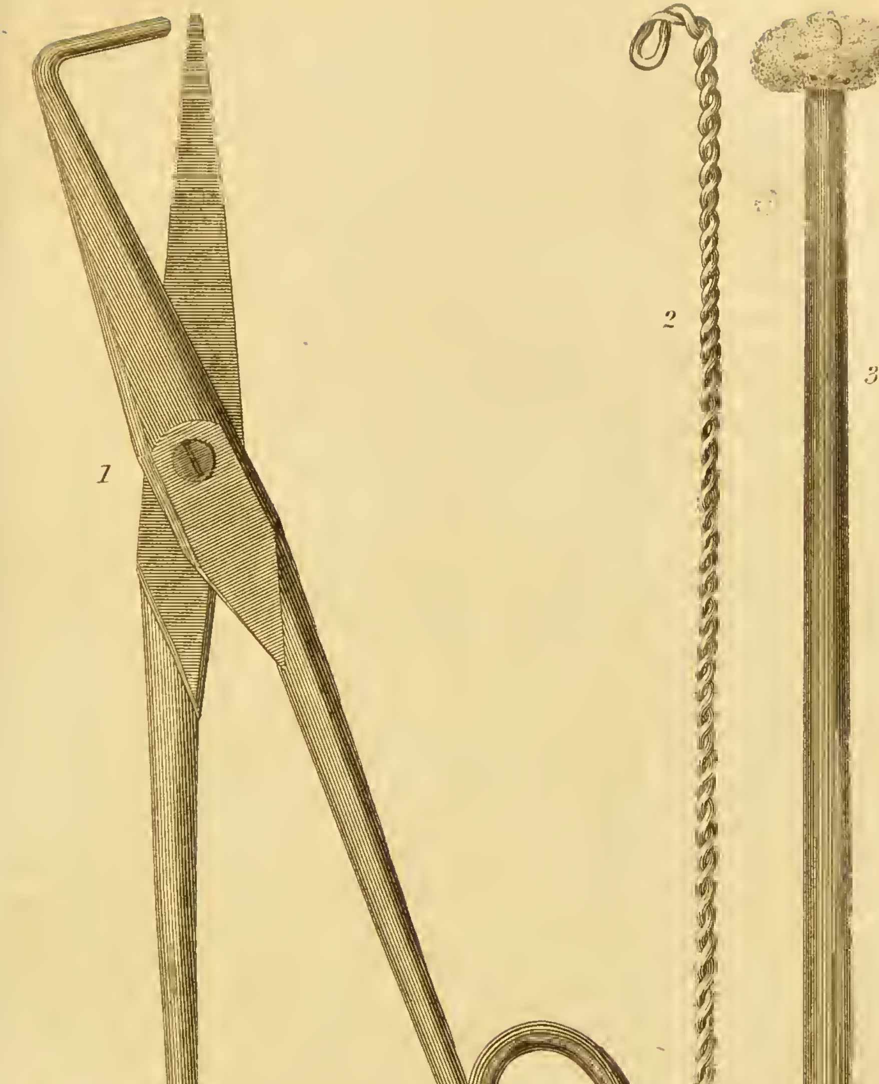
Jamais elles ne dégénèrent spontanément en cancer. Ce genre d'altération n'y survient jamais, malgré l'application imprudente et réitérée des caustiques. Le succès de l'opération, dans laquelle on enlève seulement une portion des corps glanduleux, prouve assez que leur engorgement n'a point le caractère d'un véritable squirre, &c. Richerand, Nosographie Chirurg. tom. iii. p. 295. edit. 2.

* A pair of scissars, constructed like those represented in plate 9. fig. 1. seem well adapted to this operation, as the transverse extremity of one of the blades can be put behind the uvula, and will prevent its slipping away without being completely divided.



Published March 24.1819 by Longman & Co. Paternoster Row, London.

Cooper sculpt.

side of this tube; and on their arrival near the angle of the jaw, where they begin to give off their branches to the head and neck, they even lie rather behind the side of the larynx. Hence, we see the reason why a wound at the lower part of the neck is very often fatal, while one higher up is generally less dangerous. The suicide rarely strikes at the lower part of the neck, and it is from the accidental circumstance of his cutting very high up, near the chin, that the carotids escape.

Secondly, as Mr. John Bell has explained, it should be remembered, that the carotid artery, the great jugular vein, and eighth pair of nerves, lie very closely connected with each other, being all inclosed in one mass of cellular substance, which forms a kind of common sheath for them. Now, says this author, since the eighth pair is one of the greatest nerves of the viscera, and since, from experiments on animals, we know that a wound of it is more fatal than a wound of the brain itself, this frequently puts an end at once to all questions about the way of managing wounds of the carotid artery, or of the great vein. No doubt, these may sometimes be partially wounded, and the nerve escape, but, in many instances, the nerve will be cut along with them; and at all events, the fatal consequences, which would arise from including this nerve in a ligature, make it absolutely necessary, that whenever the carotid is tied, it be first carefully separated from every other part. *

That the internal jugular vein, or the carotid artery itself, may sometimes be partially injured, without the par vagum being also hurt, or the patient instantly perishing, has now been fully proved. I know of a case, which happened in the campaign in Holland in 1814, where the internal jugular vein was ruptured by the passage of a musket ball down the neck, and yet the patient lived more than an hour after the accident, and when he died, it was from suffocation, caused by the pressure of a large mass of extravasated blood upon the trachea. M. Larrey has related an instance, in which an officer received a gunshot wound, that cut the external carotid at its separation from the internal, yet the patient's life was saved by an intelligent soldier making immediate pressure on the vessel, and the subsequent employment of bandages. † Mr. Hennen also knew of an English officer, who was saved in India by the same means, from the effects of an arrow-wound of the carotid. ‡ These cases

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* See John Bell's Discourses on Wounds, edit. 3, p. 415.

† Mém. de Chir. Militaire, tom. i p. 309.

‡ Obs. on Military Surgery, p. 180.

deserve notice, because it is very uncommon for a bleeding from so large an artery as the external carotid, much less the common carotid, to be permanently stopped by simple pressure; nor is the method generally deserving of praise, there not being in all surgery a better rule, than that of trusting only to the ligature in every wound of a great artery.

I am acquainted with an army surgeon, of whose veracity there can be no doubt, who states, that he was once called to a soldier, who had wounded the carotid with the point of a bayonet. The vessel was instantly taken up, and the man's life saved. In a modern publication may also be found another example, in which the carotid burst, and was taken up on the spot by Mr. Fleming, a naval surgeon.*

I would not assert, as Mr. John Bell has done, that it is impossible to cut through the trachea, without wounding the carotid artery, the jugular vein, and the eighth pair of nerves; but, I fully join him in the belief, that such an accident cannot be frequent. How then are we to explain the many cures, which are alledged to have taken place, notwithstanding a division both of the windpipe and of the œsophagus? We are to account for some of these extraordinary narratives in the manner pointed out by the preceding writer. "The fact is (says he), that neither the œsophagus nor the trachea is touched in the least degree, but the wound is much above them, for a suicide always strikes immediately under the chin. This wound, as far as I have observed, commonly falls in the line which divides the neck from the chin, that is, the place where the os hyoides lies, and he commonly cuts the os hyoides away from its connection with the thyroid cartilage, or pomum Adami. In that case, the thyroid cartilage, forming the uppermost part of the larynx is not touched; the rima glottidis lies below the wound quite safe. It only separates the larynx from the root of the tongue; it is properly a wound in the root of the tongue; it is rather a wound of the mouth than of the throat; and when the food comes out along with spittle and froth, it is by rolling over the root of the tongue."†

That both the trachea and œsophagus, however, may be sometimes cut, without the par vagum, or large blood vessels being also hurt, is a fact, which my own observations will not allow me to doubt. I have myself seen more than one instance, in which the wound was situated much lower than the point mentioned by Mr. John Bell, and yet both air and food issued from the cut. But if I were mistaken in the nature of these accidents, still many facts of the same kind, recorded by very able and judicious surgeons, remain in support of the possibility of a wound both of the trachea and œsophagus, without injury either of the par vagum, carotid, or internal jugular vein. *

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* Medico-Chirurgical Journal, vol. iii. p. 2.

† John Bell on Wounds, edit. 3. p. 417.

In these high wounds of the throat, it is the superior thyroid artery, which is most frequently cut. This vessel, after quitting the external carotid at the angle of the jaw, passes along the side of the upper part of the trachea, inclining forwards towards the thyroid gland in its descent, and therefore much exposed to the edge of the razor. The bleeding from this artery is profuse, and if not speedily stopped is as fatal as hemorrhage from the carotid itself. In some of these cases, the bleeding also proceeds from the lingual artery, or its branches.

The carotid artery has now been so frequently tied with success, and the best way of taking it up is so well known, that I shall not expatiate upon these topics again; but merely refer the reader to the observations, which are contained in the chapter on aneurism. The necessity of instantly tying this vessel, when wounded, is unquestionable, as well as the occasion for two ligatures, one above, the other below, the aperture in the artery. Unfortunately, so rapid and profuse is the bleeding, that the patient mostly dies in a few seconds, before any surgical assistance can be obtained.

According to Richter, the internal jugular vein has actually been tied with success. Small wounds of the same vessel, if we are to credit the accounts of this author, may sometimes be healed by means of a graduated compress, which must be retained on the part with a bandage, or, if that prove irksome, with the finger. One thing, however, is essential; namely, the pressure must on no account be remitted, until the wound in the vessel is closed. †

Pelletan once saw a wound of the throat, which proved fatal in consequence of hemorrhage from the external jugular veins; and the same eminent surgeon met with another curious instance, in which a boy, who was convalescent after a cut of his throat, suddenly fell down in a state of suffocation, and died: on examining the parts after death, it was discovered,

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* Desault's Journal; Saviard, Obs. 58.; Hennen's Obs. on Military Surgery, p. 386, &c.

† Richter, Anfangsgr. der Wundarzneykunst, b. 4. p. 173.

that the left side of the epiglottis had been detached from the glottis and root of the tongue, and that in this loose unconnected state, it had fallen upon the renia glottidis, and shut it so completely as to cause instantaneous suffocation. *

Wounds of the trachea are either simple or complicated. In both descriptions of cases, the usual symptoms are, an emission of air from the wound, loss of the voice, and sometimes emphysema. Such injuries of the windpipe, as are not complicated either with hemorrhage, emphysema, or loss of substance, may generally be easily cured by means analogous to those which are employed for the cure of wounds in general. The reunion is still more easily accomplished, when the trachea is divided longitudinally, than when it is cut transversely. If the wound be of a certain size, and attended with hemorrhage, the first indication is to tie the bleeding vessels, and, in particular, to obviate the inconvenience and danger which would result from the entrance of the effused blood into the windpipe; an occurrence which has sometimes proved fatal. † In order to guard against this danger, some authors recommend us not to close the external wound while any oozing of blood continues, so that this fluid may readily find an outlet, instead of falling into the trachea. ‡ To me it appears, that the best plan is to bring the edges of the wound in the trachea into contact by a suitable position of the patient's head, and, if requisite, even by a suture.

The greater sensibility of the larynx, its complicated structure, and the number and size of its blood vessels, render wounds of it much more dangerous than those of the trachea. They produce a great deal more irritation, and are generally attended with a convulsive cough. In the first vol. of the Mémoires de l'Acad. de Chirurgie, 4to., many cases may be consulted, which furnish proofs of this observation. In general, however, simple wounds of the thyroid cartilage heal very favourably.

Transverse wounds, extending through only the anterior half of the upper part of the trachea, generally do well. Such injuries mostly leave nerves and vessels of consequence untouched. Loss of the voice; the entrance and exit of air through the wound; and sometimes an emphysematous swelling of the integuments; are the speedy consequences of the injury. Wounds of this description, made by gunshot vio-

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* Levéillé, Nouvelle Doctrine Chirurg. t. i. p. 542.

† See Wilmer's Cases and Remarks in Surgery, p. 92.

‡ Lassus, Pathologie Chirurgicale, t. ii. p. 291.

lence, are more dangerous; but even these not unfrequently terminate well. In most instances, transverse wounds of the trachea, which have not divided it completely through, can be cured by the strict observance of a proper position. By bringing the patient's chin downward and forward to the sternum, and maintaining the head in this posture by the support of pillows, the edges of the wound in the trachea may be placed, and kept in contact, until they have grown together.

The manner in which sutures aggravate the cough, and inflame the wound, often necessitates the surgeon to withdraw them, when they have been employed. Besides the irritation, which, as extraneous bodies, they create in the trachea, they are (to say the best of them) in general very unnecessary. Nothing prevents a wound of the trachea from uniting more than the disturbance of a convulsive cough; and the irritation of sutures always increases this hurtful symptom in a much greater degree, than they do good, by maintaining the edges of the wound in contact. In fact, unless the greatest part of the trachea be divided, there never can be such a space between the edges of the wound that they cannot be brought into contact with the assistance of a judicious posture of the head.

When the troublesome cough seems to be owing to an inflammatory state of the wound, the complaint may be mitigated by bleeding and soothing remedies. In cases in which violent coughing seems principally to depend upon the copious secretion of mucus in the larynx, or trachea, the almond emulsion, spermaceti mixture, and opium, may be given with beneficial effect.

In order to prevent the entrance of the discharge and blood into the trachea, a circumstance that always excites violent coughing, it has been directed to make the patient lie on his side, with his face turned downwards. * However, nothing prevents these occurrences more than keeping the edges of the wound accurately in contact; and the patient's head may be much more steadily supported forward, when he lies on his back, than when he is on his side.

The hoarseness and weakness of the voice, sometimes remaining after the wound is healed, often disappear in a gradual manner.

Many surgical writers recommend the patient to refrain from making forcible expirations, and drawing his head suddenly backward, for a certain time after the wound is healed. By

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* Mém. de l'Acad. de Chirurgie, t. i. p. 581.

such causes, it is asserted, the recent coalescence of the wound may be easily destroyed.

When a wound has detached the upper portion of the trachea from the lower one, and it is not immediately fatal by the injury of other important parts, the bleeding vessels are first to be tied, and the two ends are then to be brought into contact. In this sort of case, I think that the employment of a suture is warrantable, on account of the immense separation of the divided parts, and the inefficacy of position alone to prevent it. A flat broadish ligature should be employed; the needle should not be introduced through the lining of the trachea; and one stitch will be quite enough, when the chin is kept properly approximated to the breast.

In cases in which the whole diameter of the trachea is cut through, the French surgeons have proposed the introduction of a flexible catheter, from one of the nostrils, into the larynx and trachea, in order to insure a passage for respiration, which, they say, without this means is liable to be intercepted when the outer wound is closed, in consequence of the two portions of the windpipe being separated and not corresponding.* This, however, is not the practice to which I should give a preference; first, because the introduction of a flexible catheter is a thing which is not always easy of accomplishment; secondly, because its use in this way is constantly productive of considerable irritation; and, thirdly, because the employment of a suture appears a better way for preserving a passage for the air, by keeping the ends of the trachea together.

With respect, however, to the introduction of a flexible catheter, from one of the nostrils into the œsophagus, for the purpose of giving food and medicines to the patient, without any motion or disturbance of the wounded parts, I consider the method entitled to the highest praise, in all cases of serious wounds, either of the larynx, the trachea, or the œsophagus. When a person swallows, the muscles, concerned in the elevation and depression of the larynx, act, in a sudden convulsive way, and cause a most injurious disturbance of the wound. But when nourishment and medicines are injected down the œsophagus through an elastic catheter, this hurtful action of the muscles is entirely prevented; the instrument may remain introduced, without any annoyance or irritation; and the requisite medicines and nourishment can be given with the utmost convenience. The military surgeon, in particular, should never be without several of these catheters; and whoever has read the relations of M. Larrey *, will already know, that in bad wounds of the throat, the patient's only chance of recovery depended upon the skilful use of such instruments.

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* Richerand, Nosographie Chir. t. iv. p. 170. edit. 4.

Wounds, made with bullets, which strike the side of the neck, and lacerate the trachea, have frequently been observed to terminate well. † M. Ravaton mentions instances, which were also followed by a recovery of the voice.

Sutures are not applicable to these cases. A strict adoption of the position recommended above, and the application of an emollient poultice, contained in a fine linen bag, are the chief local chirurgical measures. Bleeding, and antiphlogistic remedies of every description, will also be generally proper. Opium is likewise not to be forgotten, as an extremely useful medicine in cases of wounds about the throat: it not only appeases the cough, with which such injuries are often accompanied, but tends to quiet the great mental and nervous anxiety, which in examples of attempted suicide existed previously to the wound, and generally continue for some time afterwards in a very aggravated degree. Indeed, many of the unhappy persons, who attempt to destroy themselves by cutting their throats, still retain for a good while after the failure of the first attempt a determination to take another opportunity of accomplishing their fatal purpose. Hence, they cannot be too closely watched, and nothing like a razor or knife should ever be put within their reach. Vigilance is also necessary in order to keep the dressings from being displaced, and the wound torn open again, by the restless movements, or actual violence of the patient.

A total division of the œsophagus may be considered as fatal. The inevitable injury of other important parts, at the same time, would render such a case at once mortal. The celebrated Prussian surgeon, Schmucker, has treated small wounds of the pharynx and upper part of the œsophagus with success. Wounds dividing half, or even two-thirds of the tube, are also stated to have been cured. ‡ The possibility and impossibility of a cure must obviously depend on what other parts of consequence are injured.

Incised wounds, which divide the front of the œsophagus, must derive additional danger from the simultaneous division

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* In his Mém. de Chir. Militaire, tom. iv. 8vo.

† Mém. de l'Acad. de Chirurgie, tom. i. p. 576. 4to.

‡ Op. cit. tom. iii. p. 151, &c. edit. 12mo.

of the whole circle of the trachea; and indeed, so much would the internal jugular vein, par vagum, and carotid artery be exposed to the edge of the knife in a cut of this kind, that it is difficult to conceive how they can ever escape. Mr. John Bell, as we have seen, believed, that they never could; and were it not for a few cases which I have seen myself, and for some examples published by such a man as Desault, whom we cannot suppose apt to mistake a wound of the mouth for one of the trachea and œsophagus, I should be inclined to adopt Mr. J. Bell's opinion. A punctured wound, penetrating the side of the œsophagus, may not be complicated with injury of the trachea, and, therefore, may not be attended with so much peril. Such stabs, however, though not regularly mortal, are always alarming cases.

Should the case be one of those fortunate incised wounds which leave the great vessels uncut, though the injury of the œsophagus be complicated with a complete division of the trachea, the surgeon may diminish the space, between the edges of the wound in the œsophagus, by approximating the divided portions of the trachea. This effect must result from the manner in which the posterior part of the windpipe is connected with the œsophagus. But, for this purpose, a suture is only to be used in such a state of the wounded trachea as has been already mentioned, and in all other cases a proper position of the head, and the use of adhesive plaster to the external wound, are the means with which the surgeon must be content.

In cases of wounds of the œsophagus, it was recommended, as long since as the time of Ravaton, to inject nourishment and medicines into the stomach, through a smooth tube of a suitable size, introduced down the passage. In one case of paralysis of the œsophagus, that occurred in this country, a small fresh eel-skin was passed down this canal, by means of a whalebone probang, in order that nourishment and medicines might be injected into the stomach.[*] The many cases, however, in which Desault advantageously employed an elastic catheter for the same objects, had a principal influence in establishing the practice. The instrument was introduced through one of the nostrils, and was often left in the œsophagus for several days together.[†] A hollow bougie of moderate size, or an elastic gum catheter, is what is now most commonly preferred.

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[*] Hunter, in Trans. of a Society for the Improvement of Med. and Chirurgical Knowledge.

[†] See the Journ. de Chir. and Bichat's Œuvres, Chir. de Desault, tom. ii.

The practice is also sometimes absolutely necessary in complicated wounds about the face; such as those produced by the discharge of a pistol in the mouth, attended with extensive laceration of the tongue, cheeks, and fauces, great swelling of all the parts about the throat, and a comminuted fracture of the lower and upper jaw-bone. I believe, indeed, that in all fractures of the lower jaw, the introduction of a flexible catheter, from one of the nostrils into the œsophagus, is an extremely judicious measure, because the action of deglutition has the worst effect in displacing the broken bone, and disturbing the process of union.

Gunshot-wounds of the neck sometimes occasion an immediate loss of the use of the arm on the affected side; a circumstance which may in general be accounted for by the injury of some of the cervical nerves, in their descent to form the axillary plexus. *

Deep sabre-cuts of the muscles in the back part of the neck are sometimes followed by a paralytic weakness of the lower extremity, corresponding to that side of the body on which the wound is situated. In some instances, the limb becomes emaciated; in others, it appears to be well nourished. Flajani first particularly pointed out the occurrence, as common after the above kind of wounds; and many cases are mentioned by Larrey. The former surgeon in two cases tried issues in the loins, liniments, and the internal exhibition of the tinctura lyttæ; but without success. † Larrey also records many such wounds, which were followed by a wasting of the testicles, and an entire loss of all venereal desire.

CHAP. XXX.

FOREIGN BODIES IN THE ŒSOPHAGUS.

THE foreign bodies, which ought to be extracted from the œsophagus, when possible, are such as might create bad symptoms, if pushed downward into the stomach, in consequence of

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* See Hennen's Obs. on Military Surgery, p. 378., and Thomson's Report of Observations made in the Military Hospitals in Belgium, p. 75, 76.

† Collezione d'Osservazioni et Riflessioni di Chirurgia, tomo i. p. 46, &c.

their hardness, indissolubility, pointed angular shape, or other hurtful qualities. Those, on the other hand, which will produce no harm, when in the alimentary canal, and are capable of being digested, may be at once pushed down into the stomach.

Foreign bodies most frequently lodge about the upper or lower orifice of the œsophagus, seldom in the middle portion of this tube. When they are low down, the surgeon is often obliged, contrarily to his wishes, to force them into the stomach, even though they are of such a quality that their extraction would be very desirable. The foreign body is mostly situated above in the pharynx. Hence, it is an important rule, always to press down the tongue, and examine the back of the throat, before doing any thing else. Thus substances may frequently be discovered, and extracted with the fingers, or forceps, when from the patient's account one would conjecture, that they had descended much further.

Substances, which lodge in consequence of their size, cannot easily be extracted, because they fill the whole diameter of the œsophagus, and prevent the introduction of any instrument. Though, in the majority of cases, it is far better to extract than push down extraneous substances, of what kind soever they may be; yet it is commonly much more difficult, and the surgeon is often necessitated to follow the latter method.

When a foreign body is situated about the upper orifice of the œsophagus, it may be very often felt with the surgeon's finger, and if incapable of being removed in this manner, it may commonly be extracted by means of a pair of curved forceps.

One of the most common instruments, for extracting substances from the œsophagus, is a kind of hook. This is best constructed of strong flexible wire, doubled, and twisted together, in such a manner, that the bent end forms a noose, of the shape of a hook. *

Very small bodies, such as needles, fish-bones, &c. are generally more easily extracted with a piece of sponge, introduced beyond them. The art of employing compressed sponge, in the most advantageous manner, consists in taking a piece about the size of a chesnut, and introducing each end of a strong ligature through it. The ends of the ligature are then to be passed through a tube †, and fastened to that end of the instrument which the surgeon holds. The sponge is then to

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* Plate IX. fig. 2.

† Plate IX. fig. 3.

be introduced down the œsophagus beyond the foreign body, and water is to be injected through the tube, in order to moisten the sponge and make it expand.

After this, the ends of the ligature are to be firmly drawn, for the purpose of pressing the sponge against the extremity of the cannula, and making it expand still more. Then the tube is to be withdrawn, together with the sponge, observing to twist the instrument to the right and left, in this part of the operation.

When the foreign substance cannot be extracted with this instrument, a probang may be tried, to the end of which a bunch of thread is fastened, doubled so as to make an immense number of nooses. Little bodies frequently admit of being entangled, and extracted in this way, when other modes fail.

Some practitioners are in the habit of giving emetics; but this practice must be highly improper when the foreign body is angular or pointed, and is seldom of much use in any case, as patients usually make efforts to vomit of their own accord.

When foreign bodies in the œsophagus produce urgent symptoms, and cannot be extracted, it becomes necessary to push them into the stomach, whatever may be their nature or quality. The surgeon may the more readily adopt this plan, as experience shews, that such bodies, as one would imagine likely to produce most alarming symptoms, when pushed into the stomach, very often occasion no dangerous symptoms, and even not the smallest inconvenience. A whalebone probang is the common and most convenient instrument for forcing substances down the œsophagus into the stomach.

When foreign bodies in the œsophagus can neither be extracted, nor pushed downward, the consequences are various. Sometimes, the patient is soon suffocated. In other instances, inflammation and sloughing take place in the œsophagus, and occasionally febrile and convulsive symptoms come on. The consequences, however, are not invariably dangerous. Foreign bodies, especially when small and pointed, very frequently excite suppuration, after which they become loose, and are either carried into the stomach, or rejected from the mouth. Sometimes, they make their way towards the surface of the neck, occasioning abscesses there, out of which they may be extracted.

In some instances, foreign bodies, especially such as needles, after making their way through the œsophagus, travel a great way about the body, and at length, make their appearance at the surface of remote parts, behind the ears, at the shoulders, feet, &c. where they occasion an abscess, which leads to their discovery and extraction. Surgical authors have recorded a variety of examples, in which pins and needles, after being swallowed, have continued in the body many years, without making their way outward. In one instance, in particular, a needle which was swallowed, remained in the body eighteen years before it made its appearance externally. During most of the above space, not the slightest inconvenience was experienced. *

I think it superfluous to describe in this work œsophagotomy, an operation, which few would ever venture to perform. By this remark, I do not mean, however, to assert, that a case may not occur, in which a surgeon ought to make the attempt, especially when the foreign body is large, and its situation not too low down.

CHAP. XXXI.

OF THE CASES REQUIRING TRACHEOTOMY, OR LARYNGOTOMY.

TRACHEOTOMY, or bronchotomy, consists in making an incision into the trachea; laryngotomy in cutting into the larynx.

The cases for which these operations have been proposed, may be referred to two general classes; first, those in which the sole indication is to make a passage for the air; secondly, others, in which, besides this object, the surgeon has in view the extraction of a foreign body from the trachea, or larynx, or else has a particular reason for exposing the parietes of these parts.

The first class comprehends submersion; recent suffocation from gases and suspension; different species of angina; tumours formed between the œsophagus and trachea, or in front of the latter; the lodgment of a foreign body in the first of these canals; and, lastly, deep wounds of the neck.

The second class embraces, first, foreign bodies lodged in the larynx or trachea, whether they have entered by a wound, or through the glottis; and secondly, certain tumours formed in those parts.

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* See Précis d'Observations sur les Corps Etrangéres Arrêtés dans l'œsophage, &c. par M. Hevin, in Mém. de l'Acad. de Chir. tom. i. 4to.

With respect to cases, in which the indication is merely to form an artificial opening for the passage of the air, it is to be observed, that, instead of doing this by cutting into the trachea, some of the French surgeons have sometimes had recourse to the introduction of a tube down the glottis, which is to be regarded as another means of fulfilling the same design. In many of the cases, which we are about to consider, besides the mechanical impediment to respiration, produced by a foreign body, a tumour, &c. we are to take into the account, that the irritation of extraneous substances in the larynx, or œsophagus, and certain diseases about the throat, appear to be sometimes capable of exciting such a spasmodic affection of the muscles of the glottis, as has more share in producing suffocation, than any other circumstance.

1. FIRST CLASS OF CASES REQUIRING BRONCHOTOMY. SUBMERSION; SUDDEN SUFFOCATION, &C.

There can be no doubt, that in cases of drowning, suffocation from various gases, and hanging, life ceases principally from the privation of oxygen. When, therefore, in any of these cases, animation has not been suspended so long as to destroy all hope, one of the most likely means of restoring the individual, seems to be that of immediately distending the lungs with fresh air. In such examples, it is true, the indication is to make an artificial passage for the air; but then, as the muscles of inspiration have lost their power, they cannot themselves draw the air into the lungs. Hence, the surgeon has to inflate these organs with a pair of bellows, or some other contrivance, doing, as it were, the office of the inspiratory muscles.

Desault appears to have placed little reliance on inflating the lungs, in cases of submersion; and, even admitting the propriety of the measure, he sets down bronchotomy as by no means a necessary preliminary step to the introduction of the pipe employed for the purpose, and contends, that the instrument may always be passed into the larynx through the nostrils. *

This eminent surgeon had acquired a facility of introducing an elastic catheter into the trachea that furnishes abundant

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* Pelletan observes : " la bronchotomie n'est pas nécessaire pour souffler de l'air dans les poumons des asphixiés et des enfans nouveauxnes, qui ne respirent pas, car on peut aisément introduire dans le larynx une canule de gomme élastique ; l'absence de toute sensibilité rend cette opération practicable, &c." Clinique Chir. tom. i. p. 49.

proof of his own skill. But, besides the circumstance of that instrument not being the most convenient for the inflation of the lungs, I may object, that the generality of surgeons would lose too much time in effecting its introduction, and of what importance a few minutes are, in all cases of suspended animation, is a point that needs no comment. Even the bellows, furnished with a curved pipe, and intended to be passed into the larynx from the mouth, are rather difficult of introduction, and apt to occasion loss of time. Nor can this be wondered at, when the manner in which the top of the larynx is covered by the epiglottis is considered. I am, therefore, decidedly of opinion, that it is much better to have recourse at once to tracheotomy, as the readiest mode of enabling the surgeon to accomplish the inflation of the lungs.

This practice is highly proper, in conjunction with electricity, the communication of caloric to the body, the application of strong volatiles to the nose, bladders of warm water to the epigastrium, and the injection into the stomach of a warm cordial beverage, such as mulled wine, by means of an elastic catheter passed down the œsophagus. Tobacco clysters, owing to the narcotic and deleterious effects of this plant, seem by no means an eligible stimulus in cases of suspended animation.

ANGINA AND CROUP.

Some cases of angina * are attended with so considerable a swelling of the tonsils, soft palate, uvula, and surrounding mucous glands, that the breathing becomes quite interrupted, and the making of an artificial opening for respiration is most urgently indicated.

In cases of cynanche laryngea †, also, the glottis and larynx are sometimes rendered so impervious, that the only chance of preventing suffocation depends upon the prompt performance of one of the preceding operations, or rather tracheotomy; for, here, no man would prefer cutting the inflamed larynx

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* Flajani has operated in two cases of angina: one of the patients was saved. See Collezione d'Osservazioni, &c. di Chirurgia, t. iii. p. 250—255.

† Besides acute cases of cynanche laryngea, there is a chronic form of the disease, attended with a thickening and sometimes a granulated appearance of the membrane of the chordæ vocales, sacculi laryngis, epiglottis, and arytenoid cartilages. This disease slowly destroys the patient by the suffocation arising from the gradual shutting up of the rima glottidis, unless an artificial opening for respiration be made in good time. For some excellent observations on this chronic affection of the larynx, see W. Lawrence "On Some Affections of the Larynx, which require the Operation of Bronchotomy, in Med. Chir. Trans. vol. vi. p. 221, &c.

itself. In the case of enormous swelling of the tonsils, &c., Desault and Bichat are advocates for introducing an elastic gum catheter from the nose into the larynx, in order to maintain a passage for the breath; but this proceeding has always proved so troublesome and oppressive in the trials which have been made of it in England, that I apprehend it will here never be attempted again.

ENORMOUS SWELLING OF THE TONGUE.

It may arise from the sting of a venomous animal; it may occur as an effect of fevers; sometimes it originates spontaneously; while, in other instances, it is a consequence of the unskilful employment of mercury. When the respiration is exceedingly obstructed; when the swelling and redness of the countenance indicate the consequent impediment to the circulation; when large and deep scarifications, which should always be first practised, have failed in producing relief; and when the symptoms continue to grow worse; bronchotomy is the only resource; for I dismiss from consideration Desault's preference in these instances to the introduction of a gum catheter into the larynx. Many examples of a prodigious enlargement of the tongue are recorded by Flegel, Meckern, Lamalle, Louis, and Richter. The affection, however, seldom occurs in the degree here described.

FOREIGN BODIES IN THE ŒSOPHAGUS.

A foreign body, lodged in the pharynx, or œsophagus, pushes forward the posterior membrane of the trachea, and lessens, or even obliterates the diameter of this tube in such a degree, that the patient is threatened with immediate suffocation. In the register of Desault's operations, a case is mentioned, in which a woman swallowed a bone with such voracity, that it lodged in the middle of the pharynx. The patient was directly seized with all the symptoms of suffocation, and died in the course of three minutes. B. Bell notices two other analogous cases. No doubt, in many of these instances, the suffocation proceeds more from a spasmodic closure of the glottis than from the actual diminution of the diameter of the trachea by the pressure of the distended œsophagus upon it. Here, says Bichat, the most urgent indication is to make an artificial passage for respiration, in order that the surgeon may have time to take measures for the extraction of the foreign body. I may observe, however, that this is the first indication only, where the extraneous substance is unquestionably of such figure and size as not to admit of being pushed into the stomach with a probang; for, in other cases, I should contend, that this attempt ought always to be the first proceeding. But, supposing an artificial passage for the air indispensable, ought the practitioner to perform tracheotomy, or endeavour to introduce an elastic catheter into the windpipe? Tracheotomy was done by M. Habicot on a lad, who, for fear of being robbed, swallowed nine pistoles wrapped up in linen.* In similar cases, the practice of Habicot has been imitated by all surgeons. But, though Desault and Bichat are advocates for trying rather what relief may first be obtained by the introduction of an elastic catheter into the windpipe, I think most practitioners will be of a different opinion, except, indeed, where the foreign body has descended so far, that tracheotomy cannot form an effectual passage for the breath. In the first place, the procuring an elastic catheter, and its introduction, would generally occupy too much time; Desault himself had seen a patient die in the short space of three minutes. Secondly, the danger of cutting into the trachea is by no means so great as Bichat has represented; and it may be done at once even with a common pocket knife, if a surgical scalpel be not at hand.

This able writer, however, has given us one very necessary caution, respecting the possibility of thinking foreign bodies to be in the larynx, when, in fact, they are in the œsophagus, as, in each case, the symptoms of suffocation are nearly alike. Hence, before tracheotomy is undertaken, we are advised always first to introduce an instrument down the œsophagus, in order to avoid mistake. To this advice, I may add, that, if the foreign body is known to be large, it must be in the œsophagus; if small, it must be in the larynx or trachea, since large substances cannot enter the little opening of the glottis, and small ones, if they lodged in the œsophagus, would not occasion such pressure on the trachea, nor, I should think, such spasmodic closure of the glottis, as to threaten suffocation.

TUMOURS IN THE VICINITY OF THE TRACHEA.

When symptoms of suffocation are excited by some kind of tumour betwixt the œsophagus and trachea, the immediate danger arising from the impediment to respiration should be obviated by making an artificial opening in the trachea; for surgeons would not even in this case prefer Bichat's favourite scheme of passing a flexible catheter down the glottis.

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* See Mém. de l'Acad. de Chir. tom. iii. p. 145. edit. 12mo.

The same indication presents itself in large abscesses about the pharynx and larynx, if such of the collections cannot be speedily discharged, and the symptoms of oppressed breathing are urgent.

Swellings, situated in front of the cartilaginous rings of the trachea, rarely make such pressure on this tube, as to induce a necessity for making an artificial passage for the breath. The reason of this depends, either on there being no resistance anteriorly, so that the swellings extend themselves in that direction, or else on the greater incompressibility of the fore part of the windpipe. Were such a case, however, to happen, and the tumour could not be diminished or removed, tracheotomy would be indispensably necessary for the prolongation of life.

WOUNDS OF THE NECK.

Wounds, especially gunshot wounds, of the fore part of the neck, may demand the performance of bronchotomy, owing to the dangerous difficulty of breathing, produced by the considerable tumefaction of the surrounding parts, joined perhaps with a spasmodic contraction of the muscles of the glottis. In these circumstances, it is alleged, that if the trachea be opened below the injury, the surgeon may conduct the treatment, without any danger from impeded respiration. M. Habicot informs us, that being called to a young man, who had received twenty wounds in the head, face, neck, arms, chest, &c. he found him in imminent danger of being suffocated, in consequence of the swelling and inflammation about the throat. As the symptoms became worse, he determined to make an opening in the trachea, below the wound which was near the upper part of the larynx. The respiration instantly became easy; the opening was maintained till the swelling had subsided; and in three months the cure was complete. * Many other similar cases are upon record. Here Bichat argues, that the introduction of an elastic catheter should be preferred; but the judgment of modern surgeons is decidedly against his advice, as they find that the difficulty of getting a catheter into the glottis is considerable, and that when this is overcome, the plan is so intolerably

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* See Mém. de l'Acad. de Chir. tom. xii. p. 241.

irritating to the patient, and a cause of such violent fits of coughing, that the instrument cannot be continued.

2. SECOND CLASS OF CASES REQUIRING BRONCHOTOMY. SUBSTANCES IN THE TRACHEA, OR LARYNX.

The second class of cases requiring bronchotomy, are those in which a substance is lodged in the trachea, or larynx. Here bronchotomy is the only resource, since the indication is not simply to form a passage for the air, but also to extract the substance which occasions the obstruction to respiration. Desault, indeed, in one instance, appears to have introduced a gum catheter for the purpose of changing the position of the extraneous body, the flat surface of which lay transversely, and blocked up the glottis. But though this great surgeon may have had the good fortune to accomplish his design, and to enable the patient to breathe better, until bronchotomy was done, yet I think this practice neither necessary nor safe; for the extraneous substance might be pushed further down into the trachea, whence it could not afterwards be so easily extracted, and bronchotomy is an operation, which, when required at all, should never be delayed.

The substances, whose presence in the trachea may require the operation, are either formed internally, or are introduced from without. Consequently, this second class of cases may be divided into two kinds, which are essentially different.

EXTRANEOUS SUBSTANCES FORMED IN THE LARYNX, OR TRACHEA.

The first to which M. Bichat adverts, are portions of lymph, or, as he terms them, mucous congestions, which are the product of various inflammations affecting the membrane of the trachea. They are described as being ordinarily adherent, though sometimes loose and unconnected. They obstruct the canal, render the breathing difficult, and are accompanied with a rattling in the throat, a hissing noise, local pain, a feeble hoarse voice, and habitual coughing, frequently followed by spitting of blood, and expectoration of flakes of lymph. When such expectoration does not happen, and no means avail in preventing urgent symptoms of suffocation, we are, according to Bichat, to perform bronchotomy. He confesses, that the effect of this operation is always very doubtful, as the lungs are generally affected at the same time, and the patient may die of the latter disease. *

Polypi of the larynx or trachea are very uncommon, but there are instances of them on record, and Desault himself met with two cases: one was in a dead subject, that was brought to his amphitheatre, the other was in a patient that died suffocated, after being repeatedly threatened with this catastrophe. A third example was also communicated to Desault, by a surgeon with whom he was acquainted. In all these instances, the tumour was of a pyriform shape, and its pedicle was inserted into one of the ventricles of the larynx. A sense of oppression in the part; the respiration free at certain periods, and difficult at others; sometimes imminent danger of suffocation, suddenly produced by an expiration, but dispelled soon afterwards by an inspiration, are the chief symptoms of the disease, and they are easily comprehended, when we reflect on the moveableness of the tumours, and the facility with which their situation is changed by the ingress and egress of the air. When they are pushed with too much force between the edges of the glottis, they become fixed there, and, unless promptly disengaged by a succeeding effort at inspiration, the patient must perish of suffocation, as happened in the case which fell under the observation of Desault. As these polypous excrescences hardly ever project into the fauces so as to admit of being extracted through the mouth, their extirpation cannot be effected without a previous performance of bronchotomy; for which operation, in fact, there are two reasons, namely, that of enabling the patient to breathe, and that of removing the tumour.

EXTRANEOUS SUBSTANCES INTRODUCED INTO THE LARYNX, OR TRACHEA, FROM WITHOUT.

Pointed bodies, which penetrate the trachea by a wound, are sometimes only discoverable externally by a red spot, under which they can be felt. They are apt to give rise to symptoms of suffocation, and should be extracted without delay, by making a skilful incision. When the extraneous bodies are blunt, and have entered by a largish wound, they

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* These cases would here be called a species of *croup*. I was lately called into a consultation, where bronchotomy was performed for such a disease, and the patient, who was a child, recovered. A similar case is related by Mr. Chevalier, in the Medico-Chir. Trans.

will either be expelled by an expiration, or may be taken out with suitable instruments.

Foreign bodies, which have slipped into the larynx, or trachea, through the mouth, present much variety. 1. They differ in regard to their greatest diameter, which may be from one to eleven or twelve lines. 2. Their shape may be round, flat, or angular. 3. Their nature hard or soft, and susceptible, or insusceptible of enlargement from moisture. 4. Their outer surface may be smooth, slippery, unequal, or very rough. The symptoms which may arise cannot be well understood, unless these varieties be known.

Whatever may be the sort of extraneous substance, its presence in the larynx, or trachea, produces symptoms which are more or less alarming, and an acquaintance with the whole of which is necessary to an accurate diagnosis. A person has put into his mouth some kind of solid body, which has disappeared, a convulsive cough has immedialely taken place, accompanied with a hissing and rattling in the throat; the patient points out the seat of pain with his finger; there is more or less difficulty of deglutition, which is sometimes very painful; a manifest change has occurred in the voice, which is generally hoarse, and may even be entirely impeded; vast difficulty of breathing prevails; in the course of a short time, a serious obstruction in the circulation of the superior vessels is evinced by the redness of the countenance, prominence of the eyes, and fulness of the jugulars; and occasionally a degree of emphysema is apparent above the clavicle. The patient makes great efforts, is much agitated, and has an irregular intermitting pulse.

When uncertainty prevails, respecting whether the foreign body is in the trachea or œsophagus, a probang should always be immediately passed down the latter canal.

The symptoms do not constantly follow one course. Sometimes they continue without interruption in the same degree. Sometimes they gradually subside altogether, but afterwards return with increased violence. In other examples, they only cease in part, a local pain, an oppression, and a difficulty of swallowing still continuing. In short, they conduct the patient by a longer or shorter road, to a death which is almost always inevitable, unless the surgeon interpose his assistance.

This variety in the progress of the symptoms depends very much on the particular situation of the foreign body, which may lie, — 1. between the edges of the glottis; — 2. in the ventricles of the larynx; — 3. free and loose in the trachea; — 4. or fixed in this canal.

In the first case, if the opening in the glottis be entirely closed, the symptoms of suffocation come on suddenly, and the patient perishes, when prompt succour is not afforded him. But, if some small space is left for the air, then he is afflicted with a convulsive cough and local pain, and he points out the seat of the obstruction with his finger. When, in a case of this sort, the foreign body projects into the mouth, its extraction with forceps, or the fingers, should be instantly attempted. But when it has passed too far down, bronchotomy becomes necessary, not indeed to extract the foreign body through the wound, but to enable the surgeon to push it up into the mouth again.

The extraneous substance can only lodge in the ventricles of the larynx when it is of small size. The symptoms at first are then less serious, but they may afterwards prove fatal. Desault, in his lectures, used to relate a memorable case, in which a cherry-stone, lodged in the larynx, did not kill the patient till two years had elapsed. Hence, though a foreign body in the ventricles of the larynx may only excite periodical symptoms, yet, if the surgeon be certain of the nature of the case, it is his duty to make an opening for the extraction of the extraneous substance.

When the foreign body is loose in the trachea, it ascends in expiration, and descends when the breath is inhaled. At the commencement, the general symptoms occur more or less numerously; the pain is acute; the substance every instant shifts its place; the cough is frequent, and often convulsive, so much so, that the foreign body is thereby sometimes expelled. In this circumstance, it is now and then unconsciously swallowed by the patient, and much astonishment is excited by the sudden and permanent disappearance of the symptoms. But if the expulsion cannot be effected, and the body is smooth, the canal may become habituated to its presence, and the pain, oppression, cough, and difficulty of breathing, only take place at intervals. Dr. Jeffrey, of Glasgow, has a preparation, in which a piece of coal fills the trachea almost entirely, yet the patient lived for three days. * In surgical books, cases may be perused, where patients have lived even several years with extraneous substances in the trachea.

One would expect that the weight of the foreign bodies would carry them into the bronchiæ. The fact, however, is, they have seldom been found in this situation; and when an

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* Operative Surgery, By C. Bell, vol. ii. p. 6.

opening is made in the trachea, or larynx, they are almost always on a level with the incision, and are often driven out of it by the force of the breath.

Things are less propitious when the foreign bodies are unequal and rough. The membrane of the trachea being then irritated, is apt to swell, lessen the capacity of the canal, and produce an urgent necessity for the operation; while the spasmodic affection of the muscles of the glottis will also be greater, and augment the pressing danger of the symptoms. From being at first loose, the extraneous substance may become fixed. This change may also sometimes depend on the soft spongy quality of the foreign body, which, though originally small, may absorb moisture, and expanding, so as to fill the whole diameter of the tube, may excite pressing symptoms of suffocation. In all such instances, bronchotomy is strongly indicated.

The foreign body may be fixed in some part of the trachea or larynx, either with its point or asperity inserted in the membrane, or with its two ends engaged against the sides of the tube. In this case, the pain is in one place, and the ordinary symptoms prevail, modified according as the passage for the air is more or less obstructed. Here Bichat cautions us against falling into the mistake which was once made by a good surgeon: a patient, after attempting to swallow, was seized with symptoms of suffocation. Bronchotomy was performed, but as nothing was found in the trachea it was inferred that the extraneous substance had descended into the bronchiæ. The patient died, and the surgeon was surprised to find the foreign body in the œsophagus. This fact shows the prudence of always adopting the preliminary step of introducing an instrument down this last canal, before undertaking bronchotomy.

Fluids in the trachea can never be a reason for the performance of this operation; for if the force of the expiratory organs be insufficient to expel them through the natural aperture, what can avail an artificial opening in the trachea?* The escape of liquids is less easy than that of solid substances, because the former are blended with mucus and air, and diffused in the bronchia and their ramifications.

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* This reflection of Bichat's tends to condemn all those operations which have been done with a view of giving vent to any secretion in a fluid state, in cases of croup, and were the operation done only with this view, I should join in his opinion. But Bichat has invariably overlooked the closure of the glottis in these cases; a circumstance that explains the degree of relief which has often been immediately derived from bronchotomy in reputed cases of croup, even before any lymph or mucus whatsoever escaped from the artificial opening.

CHAP. XXXII.

OF LARYNGOTOMY AND BRONCHOTOMY.*

FROM what has been stated in the preceding chapters, nothing can be more evident, than that, in many instances, the sole chance of life depends upon making, without the least delay, an artificial opening in the larynx, or trachea, either for the purpose of extracting foreign bodies from the larynx threatening suffocation, or of enabling the patient to breathe, until the existing impediment to the natural mode of respiration has been removed. The first of these operations is termed *laryngotomy*, a method which, though not generally preferred in this country, has had several distinguished advocates on the continent, especially in France, where Desault, and the numerous surgeons who have issued from his school, have commonly given a preference to it. On the contrary, in England, *tracheotomy*, often called *bronchotomy*, has almost invariably been considered the best, safest, and most simple operation of the two; and, in Germany, we find amongst its partisans the judicious and experienced Richter.

Laryngotomy consists in making a transverse incision through the crico-thyroid membrane, or in slitting open the thyroid cartilage longitudinally; while bronchotomy is sometimes executed by making an incision between two of the rings of the trachea parallel to them; but, generally, by making a perpendicular division of them.

Desault, as I have remarked, was partial to laryngotomy, and he founded his preference on the following considerations. The only parts interested in the operation are the skin, cellular substance, and crico-thyroid membrane. But, in tracheotomy, the skin, much cellular membrane, and mostly the thyroid gland are cut. As, however, the latter part is easily avoidable, the risk of wounding it cannot properly be urged as an argument against the operation. Desault considered laryngotomy as attended with less risk of hemorrhage, a few small veins, and the superior laryngeal artery, being the only vessels exposed to the knife. In tracheotomy, the network of the enlarged thyroid veins and the thyroid arteries are alleged to be endangered, and then, either the risk of the blood falling into the trachea must be encountered, or the operation be perilously deferred.* The larynx, it is also said, being more easily fixed than the trachea, may be cut into with less hazard of injuring other parts. But the trachea, being more deeply situated and moveable, may slip away from the knife, which may wound even the carotids; an instance of which accident is related by Bichat.

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* Casserius de Vocis Auditusque Organis, lib. 1. cap. 20. Ferr. 1600. Habicot, Question Chirurgicale, par laquelle il est démontré que le Chirurgien doit assurément pratiquer l'operation de la bronchotomie, &c. Paris, 1620. Louis, Mém. sur la Bronchotomie in Mém. de l'Acad. de Chir. t. iv. Flajani, Osservazioni a Riflessioni di Chirurgia, t. iii. p. 230—243. 8vo. Roma, 1802. Pelletan, Clinique Chir. t. i. Lawrence, on Affections of the Larynx, requiring Bronchotomy, in Med.-Chir. Trans. vol. vi. p. 221. &c.

As to the question, which operation is most suited to the objects in view, Bichat endeavours to prove that laryngotomy always answers as well, and sometimes better than tracheotomy. If the design be merely to make an opening for the air, one situation will do as well as the other. If the extraction of a foreign body is the object, laryngotomy must evidently be the most applicable, supposing the substance to be lodged between the edges of the glottis, or in the ventricles of the larynx.

While Ferrand was surgeon of the Hôtel Dieu, a man was brought to it with urgent symptoms of suffocation, caused by a stone which had fallen into the glottis. Tracheotomy was performed, but only some blood and mucus were discharged. The patient died, and on examination, a triangular stone was found, two angles of which were lodged in the ventricles of the larynx, while the other projected at the glottis. No doubt, in this example, laryngotomy would have been the means of saving the man's life.

When the foreign body is supposed to be in the trachea, Sabatier advises this canal to be opened; but, according to Bichat, when the substance is loose, it is almost always at the upper part of the passage; and if it should happen to be fixed, and lower down, it might be extracted, by extending the cut through the cricoid cartilage, and using a pair of curved forceps.

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* Though I conceive the danger of hemorrhage here exaggerated, if an accident of this kind were to happen, the surgeon should at once tie the vessels.

Whatever differences of opinion may be entertained, however, respecting the advantages of laryngotomy in these examples, none can exist in cases of deeply seated tumours between the trachea and œsophagus; a foreign body far down the latter passage; or obstructed respiration from the swelling consequent to a transverse wound of the neck: here trachеotomy is alone applicable. I also entirely agree with Flajani in condemning laryngotomy, in croup and angina, because the wound should be made away from the seat of inflammation.*

When laryngotomy is preferred, and making an opening for the air is the only object, a transverse incision in the crico-thyroid membrane will suffice. The instruments necessary are a common scalpel, and a flat silver cannula, about an inch long, having at its sides two rings furnished with riband, being open at each end, and having laterally at one of its extremities two slits, which will serve as a passage for the air, in case the instrument should come into contact with the opposite side of the trachea.

The skin being made tense, and the larynx fixed, the skin and cellular substance are to be divided to the extent of an inch, from the lower part of the thyroid to the cricoid cartilage, between the sterno-thyroidei and hyoidei muscles. The surgeon is then to place on the membrane his finger, with which he is to guide the point of the knife. The puncture should be made rather towards the crycoid cartilage, in order to avoid an arterial branch, which usually runs along the lower edge of the thyroid cartilage. Should any vessel happen to bleed, it must be tied. Lastly, the silver tube is to be introduced, and being covered with a bit of gauze, is to be fixed in its place with ribands. Care must be taken to withdraw and clean the cannula as often as it may become obstructed with mucus, during the necessity for continuing its employment.

When laryngotomy is performed for the extraction of foreign bodies, a scalpel, a director, a straight and a curved pair of forceps are the requisite instruments. A cannula may be necessary in the case of a polypus. The skin and cellular substance are first to be divided from the upper part of the thyroid, to the base of the cricoid cartilage. The membrane between these two parts is to be opened, and a director being passed into the aperture, the thyroid cartilage is to be slit open its whole anterior extent. On the edges of the wound being now separated a little with the straight forceps, the foreign body, if it be loose, will immediately escape with the air. Should it be fixed, it must be taken out with the curved forceps. When it is engaged in the glottis, it will be most convenient to push it upwards into the mouth. When it has passed far into the trachea, the extraction may be difficult, unless the wound be enlarged by dividing the cricoid cartilage. Supposing the extraneous substance to be a polypus, the tumour must be twisted off, and extracted with a pair of forceps. In this last case, the introduction of a silver cannula, after the operation, is advised, in order to hinder the breathing from becoming obstructed by the inflammation and swelling of the membrane of the larynx, and to afford a vent for the discharge.

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* Flajani, Collezione d'Osservazioni e Riflessioni di Chirurgia, t. iii. p. 241.

In old persons, there may be a degree of difficulty in dividing the larynx, owing to ossification of the cartilages; nor can the thyroid cartilage be slit open, without some risk of injuring the chordæ vocales. In cases of cynanche laryngea, the thickened and swoln state of the lining of the larynx [*], and the impropriety of cutting the inflamed parts themselves, are strong objections to this mode of operating, which is not more eligible when the object is to inflate the lungs.

The following is the common method of performing bronchotomy.

When a free incision into the trachea is requisite, the surgeon may make an incision in the integuments, which should begin just below the inferior lobes of the thyroid gland, and be carried straight downwards about two inches. The sternothyroidei muscles are then to be pushed a little towards the side of the neck, and a longitudinal wound, of the necessary size, is next to be made in the front of the trachea. The knife must not be carried either to the right or left hand, in order to avoid all risk of injuring the large blood-vessels; and the incision ought never to extend too near the first bone of the sternum, lest the subclavian vein should unfortunately be cut.

Supposing the object of the operation is merely to make a passage for the air, the incision in the trachea need not exceed half an inch in length. In some cases, the introduction of a tube into the opening excites such irritation, that it cannot be endured: in this circumstance, Mr. Lawrence suggests the plan of removing a thin slip of the trachea, which will leave an artificial opening sufficient for respiration.

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[*] Lawrence, in Med. Chir. Trans. vol. vi. p. 249.

CHAP. XXXIII.

OF CASES IMPEDING DEGLUTITION.

A VARIETY of causes may produce an impossibility of swallowing. Some are the result of the action of external bodies, as, for instance, incised and contused wounds of the passages, through which the aliment is naturally conveyed into the stomach. Others are the consequence of internal affections, as various tumours in those passages, strictures of the œsophagus, and paralysis, and spasm of the muscles concerned in deglutition.

1. It is not an uncommon thing for persons, who attempt suicide, to discharge a pistol in their mouths, under the idea, that a quick and certain death must follow. Experience proves, however, that their design frequently fails. It is true, vast injury is the effect of the wound; yet the patient often recovers, and if he become a victim, it is not till after lingering some time. Among the causes, which, in such a case, may operate in putting a period to life, is an impossibility of deglutition. The soft parts of the mouth, being grievously contused and lacerated, become affected with enormous swelling, and consequently the passage from the mouth into the pharynx is quite obstructed. Even when the tumefaction is not considerable enough of itself to produce a total impediment to deglutition, this serious affection may be caused by the paralysis of the muscles of the pharynx, occasioned by the violent concussion, to which they have been subjected. It is hardly necessary to state, that, in all such cases, the patient would mostly perish, if no means of conveying aliment and medicines into the stomach were devised. Such means, however, we fortunately possess in the elastic gum catheter, which is to be passed from the nose down the œsophagus. In 1789, Desault was called to a young man who had discharged a pistol, loaded with three bullets, in his mouth. A part of his tongue was shot away; his jaw was fractured; and the roof of his mouth broken to pieces. A prodigious degree of swelling quickly ensued. On the third day, nothing could pass into the stomach, and, no doubt, had not an elastic catheter been used, the patient's death would have been inevitable. With the assistance of this instrument, a recovery was speedily effected.

2. Incised wounds of the neck, either above the os hyoides, betwixt this bone and the thyroid cartilage, or below the

larynx, may interest the pharynx, after dividing the organs situated in front of it. Such an accident may become complicated with tumefaction, so as to be attended with the same sort of impediment to deglutition as accompanied the preceding case; or, if such swelling should not occur, the wound in the pharynx may let the victuals fall into the larynx and trachea. The consequences are most violent coughing, danger of suffocation, and such loss of strength as tends to a fatal termination.

3. In the second class of obstacles to deglutition are to be arranged, 1. Excessive enlargements of the tonsils, either acute or chronic. 2. A considerable swelling of the tongue, completely closing the passage from the mouth into the fauces. 3. Tumours in the course of the œsophagus, and dangerously compressing it. Of this nature are abscesses, betwixt the latter tube and the trachea. 4. Inflammation of the pharynx, which affection either prevents deglutition by the tumefaction excited, or else by hindering the contraction of the muscles; just as we find the inflamed bladder cannot expel the urine. 5. Strictures of the œsophagus. 6. Tetanus is also mentioned by Bichat, the case being attended with such a spasm of the masseter, that the lower jaw cannot be at all depressed. However, M. Larrey, in Egypt, my friend the late Mr. C. W. Cruttwell, of Bath, and other surgeons, have found, that an elastic gum catheter cannot be passed down the œsophagus, in tetanic cases, owing to the violent paroxysms of spasm, and sense of suffocation, induced by the attempt. 7. Spasmodic contraction of the muscles of the pharynx. 8. Lastly, atony of the same organs.

When the foregoing obstacles to deglutition prevail too long, death must happen; and, if the surgeon cannot effect a timely removal of them, it is his duty to have recourse to some palliative plan, in order to maintain life, while he endeavours to obviate, by methodical means, the causes which threaten the patient with so much danger. The palliative means are of two kinds: 1. Nourishing clysters: 2. The introduction of liquid food through the nostrils, or mouth, by an artificial contrivance.

The inutility of nourishing clysters is at present generally acknowledged. The lacteals, which decrease in number, in proportion as the intestinal canal approaches its termination, cannot take up an adequate supply of nourishment, and the patient, if not supported by other means, must soon die.

Whatever artificial means be employed, the introduction of liquid food, through the mouth, is almost always impracticable. The organs of this cavity, indeed, are usually the seat of the obstruction, which it is either dangerous, or impossible to remove. The surgeon has it not in his power to choose this way, in enlargements of the tongue, tonsils, or soft palate, or in gunshot wounds of the mouth, &c. In fact, he can choose this method in few instances, except wounds of the lower part of the neck, or tumours in the course of the œsophagus.

The nostrils generally present a much more ready passage. Being alway pervious, the fluid aliment may be transmitted through them into the pharynx, which is itself generally free, at the back of the obstruction, as for instance, an enlarged tongue, or tonsil.

In the cases under consideration, elastic gum catheters are highly convenient, as, when empty, they are quite flexible, and when filled with the stilet, they are tolerably firm. The latter quality renders them easy of introduction; the former makes their presence in the œsophagus unattended with uneasiness to the patient. Desault was constantly in the habit of employing them: their length was proportionate to the extent of the passage into which they were to be introduced; and their diameter was equal to that of the largest urethral catheters.

Here I may remark, that, in a case of stricture of the œsophagus, it would be necessary to employ a catheter of smaller size. In a case related by Bichat, Boyer was not able to get a gum catheter beyond the stricture, before he had forced a silver catheter through the obstruction. The latter instrument was passed from the mouth.

When the gum catheter is to be passed from one of the nostrils down the œsophagus, it is to be strengthened with the stilet, and moderately bent, in the form of an urethral catheter. It is to be held like a pen, and passed through the nostril, with the concavity turned downwards. It is to be pushed on slowly; drawn back, when impeded by any obstacle; and then pushed on again, until its end reaches about the middle of the pharynx. The surgeon is now, with one hand, to withdraw the stilet, while with the other he pushes the tube further down the œsophagus. Should the catheter enter the larynx, which sometimes happens, and which may be known by the pain, violent coughing, stoppage of the instrument, &c., it is immediately to be drawn back, and its introduction attempted again.

When the surgeon is sure that the gum catheter is properly introduced, its outer end is to have a piece of thread attached to it, the extremities of which are to be wound round pins in the patient's cap.

With a syringe, the surgeon can now inject either liquid food or medicines into the stomach.

The catheter is to be kept introduced, until the obstacles to deglutition are removed.

In the example quoted above, where Boyer could not get a gum catheter through the stricture, until he had passed a silver one through it, the introduction of the former instrument through the nostrils was found quite impracticable. But, as it was an object of importance to fix the outer end of the catheter in the nose, so that the instrument might be kept conveniently introduced, Boyer accomplished his wish, by first conveying one end of a ligature through the nostril to the fauces with a probe, whence it was drawn out of the mouth with a pair of forceps. The upper part of the catheter was then fastened to this end of the ligature; and the instrument was pushed, from the mouth down the œsophagus, until its upper end alone remained visible at the back of the mouth. With the extremity of the ligature, the upper portion of the catheter was then drawn from the fauces out of the nostril, and fixed there. *

CHAP. XXXIV.

WRYNECK.

IN this complaint, the head is drawn towards one of the shoulders. In general, the face is turned towards the opposite side; but, occasionally, towards that to which the head inclines. The affection, when in a high degree, renders the head quite immoveable, so that neither the patient, nor any other person, can place it in its proper position. Hence, when the patient wishes to look in any direction, except immediately before him, he is necessitated to turn his whole body. Sometimes the head can be moved, but not brought into a straight posture. In other instances, the patient, with exertion, can manage to keep his head straight for a short time; but it soon becomes inclined again towards the shoulder.

Generally, on the side towards which the head inclines, the neck seems exceedingly plump, the strong shortened muscles

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* See Mémoire sur les Moyens de Nourrir les Malades chez lesquels la déglutition est empêchée, in Œuvres Chir. de Desault, par Bichat, tom. ii. p. 282, &c.

being bulky, and affected with considerable spasm; while, on the other hand, the opposite side, where the neck is convex, exhibits no such strong rigid muscles, or, at all events, so little of this appearance, that, notwithstanding its convex form, it has obviously a less fleshy appearance. When the disease has continued a long while, and attained a serious degree, its effects extend also to the head itself. On that side, where the irregular action of the muscles is strongest, and where consequently the head is most drawn downwards, the half of the face is usually more or less contracted, and weaker than the opposite half, the zygomaticus major, the buccinator, the masseter, and other muscles, being considerably less prominent.

The complaint is usually owing to a defect in the muscles concerned in moving the head. When, however, the deformity has existed a long time, and particularly, when it has begun in an early period of childhood, and has continued during the growth of the body, the cervical vertebræ either assume a preternatural formation, or become anchylosed, in which circumstances the case is, for the most part, totally incurable. This participation of the vertebræ in the disorder, however, does not always exist, even though the deformity may have begun at an early period of life, and prevailed a considerable time. Richter mentions several instances, in which wrynecks of the most unpromising description were cured; cases, in which the head had been quite immoveable; the disease of twelve and sixteen years' duration; and its origin had taken place in infancy. * Professor Jörg †, of Leipsic, assures us, that he has never seen any cases in which the complaint originated in the bones: the muscles were always the parts first concerned. According to his observations, the sterno-cleido-mastoideus is to be looked upon as the chief and original cause of the deformity, which he has never seen unattended with the particular and manifest influence of that muscle. While, says he, it is more disposed to irregular action than any other muscle of the neck, its greater strength makes it in some measure govern the rest.

The same writer does not give much credit to the opinion, that the wryneck is frequently brought on by a contraction of the skin of the neck, and of the platysma myoides; although we know, that our countryman Gooch effected a cure by simply

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* Anfansgr. der Wundarzn, b. iv. p. 276.

† Ueber die Verkrümmungen des Menschlichen Körpers, und eine rationelle und sichere Heilart derselben. 4to. Leipzig, 1816.

dividing these parts; but Professor Jörg thinks, that when these textures, or any other muscles of the neck are shortened, it is generally as a consequence of the affection of the sterno-cleido-mastoideus, which is the part originally disordered. With the exception of cases produced by the contraction of cicatrices, Jörg's sentiment is probably correct. With respect to a malformation of the cervical vertebræ being the primary cause of a wryneck, this author does not presume to deny the possibility of the thing; but he has never seen a single instance of it.

When the deformity follows the contraction of a cicatrix, the cure is by no means easy to accomplish. A transverse incision is made through the integuments, and the head is afterwards kept in a straight posture by some mechanical contrivance, until the wound is perfectly healed. The apparatus is left off, and the distorted position of the head returns, as surely as the granulations, by which the new wound has been filled up, are absorbed. Whether the entire removal of the first scar, as suggested by Mr. Earle, will have better success, time must determine. In some instances of children, in whom the chin was nearly in contact with the breast, in consequence of the effect of severe burns, I have known considerable and permanent amendment follow the division of the longitudinal folds in the cicatrized parts.

In the common examples, depending chiefly upon a loss of equilibrium between the muscles of the opposite sides of the neck, and especially upon a rigid contraction of one of the sterno-cleido-mastoidei, the usual means, which sometimes succeed, are camphorated mercurial frictions on the part, even till salivation occurs; the internal exhibition of opium, together with mercurial frictions; electricity; stimulating embrocations; the shower-bath; blisters; issues, &c. These remedies should be assisted with mechanical contrivances, for gradually bringing the head into a straight position. The best apparatus which I know of for this purpose is that invented by Professor Jörg. It consists of a pair of leather stays, and of a band, or fillet, which goes round the head. On the centre of the fore-part of the stays is a kind of pulley, or grooved wheel, which can be turned round with a key in one direction, but not in the other, as it becomes fixed by means of a spring. From this pulley, or wheel, a band proceeds up the neck to the fillet on the patient's head, to which it is fastened directly behind the ear, close to the mastoid process. The band lies in the same direction as the lengthened sterno-cleido-mastoideus muscle, and when drawn towards the breast by means of the wheel, it produces the same effect as would arise from an increase in the action of that muscle. In short, it pulls the mastoid process downwards and forwards towards the sternum, counteracts the opposite muscle of the same name, and rectifies the position of the head. Professor Jörg makes his patient wear this apparatus day and night; nor does he take it off even when the contracted rigid muscles are rubbed with the liniments which he recommends.

When, by perseverance in the use of this simple invention, and other means, the position of the neck has been improved, the head is generally found to have a disposition to incline too much forwards; an effect, which the contracted sterno-cleido-mastoideus, and its antagonist, the band, both tend to promote. In order to hinder this, Professor Jörg removes the end of the band from the breast, carries it under the arm, and through a ring at the side of the leather corsets, or stays, and thence to the fillet on the head, where it is fastened close to the mastoid process. The ring hinders the band from chafing the axilla, and from following the motions of the shoulder. *

It is when the disease originates from a contraction of the muscles on one side of the neck, quite unattended with the smallest perceptible induration, that an operation is advised for dividing the contracted muscular fibres. This, however, must only be performed when the wryneck depends entirely, or principally, on a contraction of the sterno-cleido-mastoideus. When the defect is situated in the other muscles, or the cervical vertebræ are altered, the operation is not advisable. When the above muscle is alone, or chiefly concerned, the face is always turned from that side to which the head is inclined; and in endeavouring to put the head in a straight position, the fibres of the muscle are rendered exceedingly tense. As far as my judgment goes, however, this case is not essentially different from that which Professor Jörg particularly recommends to be treated with machinery.

Should Sharp's operation of dividing the sterno-cleido-mastoideus be determined upon, it will generally be prudent at first only to cut through the clavicular portion of it. If the surgeon should determine to cut out a part of the fibres, the incision must be made through the skin, exactly in the direction of this portion of the sterno-cleido-mastoideus. If he means simply to divide it, a transverse wound will suffice. On this part of the muscle being completely exposed, the rest of the

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* Plate VII. Fig. 4. Professor Jörg's apparatus applied.
Fig. 5. Back View of the leather stays.
Fig. 6. Key for turning the pulley.

operation is to be completed by passing a director, and blunt-pointed curved bistoury, under the place where the division is intended to be made. If a part of the muscle is to be removed, the operator may most conveniently finish the operation with a pair of forceps, and a common knife.

Wrynecks sometimes depend on paralysis of the muscles of one side of the neck, particularly of the sterno-cleido-mastoideus. The muscles of the opposite side, in this case, draw the head out of its proper position, in consequence of not being counteracted by their paralytic antagonists.

Here electricity, setons, blisters, volatile liniments, the cold bath, and tonics, are indicated. The state of the bowels and digestive organs should also be carefully regulated. The head should be kept in a straight position during the trial of these remedies, as paralytic muscles are more apt to recover their tone in a tense, than in a relaxed state.

CHAP. XXXV.

BRONCHOCELE.

BRONCHOCELE signifies an indolent enlargement of the thyroid gland; and of course it is attended with a swelling of the upper and front part of the neck. The tumour is quite free from pain; and in its incipient state is of a soft, spongy, elastic consistence. Its base is usually broad. When the case has existed some time, the gland loses its natural figure, assumes a firm fleshy feel, being, however, firmer in some places than in others, and it spreads towards each side of the neck. The diseased gland may, in time, attain a prodigious magnitude. When the adjacent cellular substance, and lymphatic glands, participate in the disease, the base of the swelling sometimes extends from one side of the neck to the other. In a few instances, only one lobe of the gland is affected.

The bronchocele seems to be endemic in several mountainous countries; for instance, Switzerland, Savoy, the Tyrol, Derbyshire, &c. It is most frequent in young persons, and occurs more often in the female than the male sex.

Dr. Baillie observes*, that when a section is made of the thyroid gland, affected with this disease, the part is found to consist of a number of cells, which are of different sizes, and contain a transparent viscid fluid. *

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* Prosser tells us, that Dr. W. Hunter examined a diseased thyroid gland with a glass, and found it to be enlarged by a number of cysts, or bags of a watery humour, which ran out, when the gland was punctured. On Bronchocele, or Derby-neck, edit. iii. 4to. p. 18.

The ordinary bronchocele is entirely a local disease, patients usually finding themselves, in other respects, perfectly well. The tumour itself sometimes creates no particular inconvenience; and is merely a deformity. Large bronchoceles, however, are frequently attended with obstruction to respiration, and hoarseness of the voice. There is no malignancy in the disease, and the swelling does not readily inflame.

The causes of bronchocele are involved in great obscurity, and are not yet determined. At one time it was conjectured, that drinking water, obtained from melted ice or snow, frequently gave rise to the disorder. The disease, however, is frequent in Sumatra, where ice and snow are never seen; while it is entirely unknown in Thibet, where the rivers are exclusively supplied by the melting of the mountain's snow. † Bronchocele has often been regarded as a scrofulous complaint; but this doctrine is denied by Mr. Prosser, who argues, that the disease is often seen in persons entirely free from any mark of scrofula; and that while boys are as subject to scrofulous disease as girls, the bronchocele of this country occurs only in young females. ‡

TREATMENT OF BRONCHOCELE.

The disease, in a recent state, may frequently be cured; when inveterate, though it is often capable of being considerably diminished, it can hardly ever be entirely removed.

The most celebrated remedy for bronchocele is burnt sponge, given in the dose of a scruple, two or three times a day. The powder may be made into an electuary with syrup. It is often prescribed in the form of a troche, the efficacy of which is said to depend very much on its being placed under the tongue, and allowed to dissolve there in a gradual manner. It is sometimes customary to add a grain of the submuriate of mercury to each of the above doses. A mercurial purgative is also usually given about once a fortnight. § The subcarbonate of soda is another medicine occasionally employed.

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* Morbid Anatomy of some of the most important Parts of the Human Body, p. 84. edit. 2.

† See Sketches of the Philosophy of Life by Sir T. C. Morgan, M.D. p. 426. 8vo. Lond. 1818.

‡ An Account and Method of Cure of the Bronchocele, or Derby-neck. 3d edit. p. 5. 4to. Lond. 1782.

§ See Wilmer's Cases in Surgery.

Other remedies are, two scruples of calcined egg-shells, given every morning in a glass of red wine; ʒss. of the kali sulphuratum, dissolved in water, taken daily; ten or fifteen drops of the tinct. digit. purpur. twice a day, the dose being gradually increased; muriated barytes; cicuta; belladonna, &c.

External applications may also be employed, in conjunction with any of the above internal remedies. Repeated frictions of the swelling with a dry towel, and bathing it very often with cold water, are found beneficial. Some practitioners direct the part to be rubbed with the aq. ammon. acet., or with a liniment composed of an ounce of camphor, three drams of olive oil, and the same quantity of the spir. ammon. comp.

Very large bronchoceles sometimes obstruct respiration, deglutition, and the return of the blood from the head, in so serious a degree, that a surgeon would feel greatly inclined to make any rational attempt to relieve his patient, even though it might be one of a bold description. For the relief of these cases, two operations have been proposed; one consists in cutting out the enlarged gland; the other in effecting a reduction of its size by tying the superior thyroideal arteries. *

EXTIRPATION OF THE THYROID GLAND.

This operation can only be attempted with prudence before the part has become exceedingly large, and then, indeed, the symptoms are seldom sufficiently pressing to induce the patient to submit to a measure which is, no doubt, attended with a serious degree of hazard. Until recently, surgeons have had very little encouragement to attempt the extirpation of bronchoceles. In one instance, in which Mr. Gooch saw the endeavour made, the hemorrhage prevented the completion of the operation, and the patient died in less than a week, the bleeding having never entirely stopped. In a second case, adverted to by the same writer, the patient's life was preserved by having a succession of persons to keep up a constant pressure on the wounded vessels day and night for nearly a week, the surgeon not having been able to secure them with the needle and ligature. Mr. Gooch likewise mentions a third

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* A paper was lately read to the Medico-Chirurgical Society of London, giving an account of a mode of curing bronchocele, by passing a seton through the tumour, as practised at Naples. As, however, the details will shortly be laid before the public by the Society, I shall not enter into the subject.

case, in which the operation was followed by a great deal of bleeding, and a fatal event.*

The unfortunate terminations of these cases may be imputed partly to the disease having been allowed to become too large, and partly to imperfections in the mode of operating. That bronchoceles, when not of excessive size, may be extirpated with success, is now completely proved by the experience of Desault, Theden, and Vogel, who have all practised the operation with the happiest consequences. In a case in which the tumour was two inches in diameter, round, hard, and adherent to the middle of the right side of the trachea; and in which it thrust outwards the sterno-cleido-mastoideus muscle, rose with each diastole of the arteries, followed the movements of deglutition, and somewhat obstructed the passage of solid food; Desault performed the extirpation after the following manner: An incision was made along the middle of the swelling, beginning about an inch above, and ending at the same distance below it. This extent was given to the wound for the purpose of having plenty of room for the continuance of the dissection. The inner edge of the incision being drawn to the left by an assistant, the tumour was next separated from the sterno-cleido-mastoideus by the operator cutting the cellular substance that connected these parts. In doing this, two small arteries were divided, and immediately tied. The next object was to detach the inner part of the swelling from the trachea. While this was performed, the assistant drew the tumour outwards with a hook. In this part of the operation, several branches of the thyroid arteries were tied as soon as cut.

The assistant, with the hook, then pulled the gland inwards and forwards, while Desault finished the dissection outwards, and above and below. This part of the operation was the most difficult, and it was necessary every instant to wipe away with a sponge the little blood that was effused, in order that the parts might be distinctly seen. The operator only ventured to divide a very little at a time, and every part was carefully examined with the fingers before it was cut. With these precautions, Desault succeeded in exposing the superior and inferior thyroideal arteries, without wounding them, and a ligature was immediately put under them by means of a curved blunt needle. The vessels were then divided, and the detachment of the swelling from the trachea completed. The patient was discharged from the Hôtel-Dieu, quite well, on the 34th day after the operation.

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* Gooch's Chirurgical Works, vol. iii. p. 158—160. edit. 1792. To these unsuccessful cases may be added the example recorded by Pelletan, in his Clinique Chirurgicale, where an enlarged thyroid gland, weighing two pounds six ounces, was cut out, after an operation that took up an hour and a half, and proved fatal thirty-five hours after its performance.

The tumour which was removed was nearly five inches in circumference. The wound made in the operation was almost three inches in depth, being bounded externally by the sterno-cleido-mastoideus, internally by the trachea and œsophagus, and behind by the common carotid, and par vagum, which were visible.*

That the extirpation of the thyroid gland is a delicate and difficult operation, must be evident to every body at all acquainted with anatomy. Above, the superior thyroideal arteries; below, the inferior ones; and sometimes also that branch which was first discovered by Neubort; at the sides, the common carotids, and internal jugular veins; in front, an extensive plexus of veins; and the trachea, œsophagus, recurrent nerves, and par vagum, all close to the tumour; are numerous parts of such importance, as to make the operation a business only fit for a surgeon, who, to the most correct anatomical knowledge, joins a steady hand, and an undaunted mind.

The imperfection, to which I alluded in speaking of the operations mentioned by Gooch, consisted in not tying every small artery as soon as it was divided, and cutting away the swelling, without endeavouring first to secure the large arteries. Attention to these circumstances constituted the excellence of Desault's plan of operating, and enabled him to surmount every danger, as far as hemorrhage was concerned.

OF TYING THE SUPERIOR THYROIDEAL ARTERIES.

When respiration and deglutition are dangerously interrupted by an immense bronchocele, the removal of which seems impracticable, it may perhaps be a warrantable experiment to expose and tie the superior thyroideal arteries. When the quantity of blood flowing into a tumour is greatly lessened, the size of the swelling commonly soon undergoes a considerable diminution. This may be regarded as a general principle, in the treatment of all tumours whatsoever. This operation has been actually practised, and though a fatal hemorrhage succeeded, the great decrease in the size of the gland before death, is a sufficient encouragement to repeat the trial, particularly as the method of applying ligatures round large arteries is now brought into a very improved state. If the femoral, and even the external iliac arteries will heal, when tied in the manner recommended by the best modern surgeons; if also the common carotid will undergo the same beneficial change, as recent cases have proved *; we can entertain no doubt, that the superior thyroideal will do so. In fact, Desault, Theden, and Vogel, tied all the thyroideal arteries in extirpating bronchoceles, and these vessels healed as well as any others.

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* Œuvres Chirurg. de Desault par Bichat, tom. ii. p. 298—301.

In applying the ligature, the operator, above all things, should be very careful to use one which is firm, and of an evenly round shape, which qualities tend to render the division of the inner coats of the artery more certain of happening in the most desirable way. With the same view, the vessel should be tied with due force, and, for reasons explained in the chapters on Hemorrhage and Aneurisms, the ligature should be applied to the vessel, as closely as possible to where it lies among its natural connections.

CHAP. XXXVI.

WOUNDS OF THE THORAX

ARE divided into those which do not penetrate, and into others which do penetrate that cavity.

The former do not differ in their nature from common wounds, and therefore do not demand particular consideration.

Cuts and sabre wounds hardly ever interest the parts contained in the chest; stabs and gunshot wounds are the ordinary kinds of violence, by which the thoracic viscera are injured.

Wounds which simply penetrate the chest, without wounding any contained part, are often unaccompanied by any dangerous, or peculiar symptoms.

It is frequently difficult to pronounce positively, whether a wound extends into the cavity of the thorax or not. Many

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* See Medico-Chirurgical Trans. vols. i. and ii.

punctured wounds are very long and narrow, so as not easily to admit a probe to their termination. Many are made when the patient is in a posture which you cannot precisely ascertain, and in which alone their track can be traced with a probe. But if the symptoms do not indicate any difference between a superficial wound of the chest, and one which just enters its cavity, no practical good can result from knowing to which description it answers, and much mischief may arise from tedious examinations.

Sometimes, however, the passage of air into and out of the chest, through the wound, leaves no doubt that the injury extends beyond the pleura costalis. But this symptom can only be expected when the wound is straight and freely pervious.

The entrance and exit of air through the wound arise from the alternate enlargement and contraction of the thorax in respiration. It is well known, that in the perfect state, the surface of the lungs always lies in close contact with the membrane lining the ribs, both in inspiration and expiration. The lungs themselves are only passive organs, and are quite incapable, by any action of their own, of expanding and contracting, so as to maintain their external surface constantly in contact with the inside of the thorax, which is continually undergoing an alternate change of dimensions. Every muscle, that has any concern in enlarging and diminishing the chest, must contribute to the effect of adapting the volume of the lungs to the cavity in which they are contained, while there is no communication between the cavity of the pleura and the external air. In inspiration, the thorax is enlarged in every direction, the lungs are expanded in the same way, and the air, entering through the windpipe into the air-cells of these organs, prevents the occurrence of a vacuum.

But when there is a free communication between the atmosphere and the inside of the chest, on this cavity being expanded, air must enter into the bag of the pleura, and the lung remain proportionally collapsed. There are several reasons why this event does not regularly take place in wounds of the chest; the principal one is, that the opening is seldom sufficiently ample and pervious, and is soon covered with dressings; another is the great frequency of adhesions between the pleura costalis and pleura pulmonalis.

When, however, air has entered the bag of the pleura, through the wound, it is partly forced out again as soon as the muscles of expiration diminish the capacity of the thorax.

It is a wise arrangement to have no communication between the two bags of the pleura: if it were not so ordained, suffocation would be a common consequence of large wounds extending into the chest. Bertrandi informs us, that if a free opening be made into each side of the chest of an animal, both lungs collapse. Yet this statement does not altogether coincide with the observations and experiments of other writers. That, in cases of emphysema, the lung does sometimes collapse, and air fill up the space, which that viscus previously occupied, is a truth, of which the experience of the most able surgeons furnishes abundant proof.* But, in other instances of emphysema, upon an opening being made into the chest, no air was found in the bag of the pleura, the lung was seen in contact with the side of the chest, " nor did it recede when exposed."† It also appears from the experiments of M. Bremond, that not only when an opening is made into the cavity of the thorax, but even when some of the ribs are removed, the lungs still occupy their natural situation, and actually protrude at the opening during expiration.‡ Other investigations likewise tend to the conclusion, that frequently the lungs do not collapse, when the cavity of the chest is exposed in the living animal §; a fact, which Mr. Abernethy had also an opportunity of ascertaining in a case, where he divided the pleura costalis in an instance of supposed hydrothorax, in which no water was found.|| And in opposition to the assertion of Bertrandi, the occasional recoveries are cited, in which there were wounds on both sides of the thorax, larger than the orifice of the ¶ glottis. The cases of herniæ of the lungs, in wounds of the thorax, are additional proofs, that these organs do not invariably collapse though a free opening be made in the chest. The circumstances, however, which account for the lungs collapsing in some cases, and not in others, are at present quite unexplained, except inasmuch as the event may be influenced by the presence of adhesions, and the size, and direct or indirect course of the wound in the side of the chest. If we find in a single instance, that a free and direct opening can be made in the thorax, without inducing a collapse of the lung, though no adhesions exist, (a fact now fully established,) is it not reasonable to suppose, that, unless other causes be concerned, a wound of precisely the same nature can never have such a consequence?

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* See Abernethy's Surgical Works, vol. ii. p. 171. edit. 1811.

† Op. cit. p. 175.

‡ Mém. de l'Acad. des Sciences, an. 1739.

§ Norris, in Mem. of the Med. Soc. of London, vol. iv. p. 440.

|| Surgical Works, vol. ii. p. 179.

¶ Hennen, in Obs. on Mil. Surgery, p. 405.

We shall next notice the most urgent symptoms, likely to follow wounds of the chest, and the method of treating them.

EMPHYSEMA

Is a swelling, arising from a diffusion of air in the cells of the cellular substance. It may occur in wounds which just enter the cavity of the chest; in others that extend more deeply, so as to wound the lungs; and also in cases in which these organs are wounded by the spiculæ of a broken rib, or clavicle, while there is no outward wound whatever. I believe emphysema is never very extensive, when the air vesicles of the lungs are uninjured, and there is an outer wound, through which the air can freely make its escape. Hence we find, that emphysema is a more common consequence of fractured ribs, and narrow stabs, than of large penetrating wounds; because, in the latter cases, the air readily passes outward, through the opening.

When the chest becomes expanded, in the act of inspiration, some of the air, which enters through the trachea into the wounded lung, instead of distending this organ, now passes through the breach in it, so as to get into the space between the pleura pulmonalis and pleura costalis. * Dr. Halliday has very accurately remarked, that, in the living body, the whole of the inspired air will not be thus effused; but that, as it must pass through the lung, it will at first distend it, more or less, according to the size of the opening in the pleura pulmonalis. This partial dilatation of the wounded lung will always happen while air continues to be inspired on that side.

When the thorax is next diminished in the act of expiration, the effused air is compressed against the wounded lung; but none of it can enter this viscus again, because the whole of the air contained in the lung must be forced out, and the effused air makes equal pressure on every part of the organ, as this becomes collapsed, so that it cannot separate any particular part, and make a passage for itself towards the trachea.

In this manner, fresh air accumulates in the space between the pleuræ at every inspiration, while none can escape during expiration. This case may produce suffocation from the pressure of the collected air on the diaphragm, mediastinum, and opposite lung.

However, as emphysema commonly follows narrow stabs, or fractures of the ribs, attended with injury of the lungs, the

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* Observations on Emphysema, 1807.

pleura costalis and intercostal muscles are at the same time wounded or lacerated, so that part of the air also usually gets through the above wounded membrane and muscles, into the cellular substance on the outside of the chest, and thence is sometimes diffused, through the same substance, over the whole body, so as sometimes to inflate it in an extraordinary degree. The inflation of the cellular substance has been considered the most dangerous part of the disease; but Mr. Hewson * most ably shews, that this is only an erroneous supposition. The wound of the pleura and intercostal muscles may sometimes be too small to suffer the air to get readily into the cellular membrane, and may confine a part of it in the cavity of the thorax, in which circumstance, it will compress the lungs, and cause the same symptoms of tightness of the chest, quick breathing, and sense of suffocation, which water does in hydrops pectoris, or matter in empyema.

The air, however, in general makes a way for itself through the cellular membrane; and as the passage of air into the cavity of the thorax, through the breach in the lung, during inspiration, is more easy, than the return of that which has been already effused into the cellular membrane, this effusion continues to go on with great rapidity, being increased by every act of expiration.

One of the most remarkable cases of emphysema is related by Littre. † The swelling on the chest was eleven inches thick, nine on the abdomen, and four on all other parts of the body, except the scalp, palms of the hands, and soles of the feet. The patient spit blood, had much difficulty of breathing, and made violent efforts to inspire.

So unlimited is the diffusion of air in some cases, that the cellular substance beneath the conjunctiva of the eye has been known to be prodigiously inflated.

From what has been stated, it is evident, that, in cases of emphysema, the danger does not depend so much on the extent of the external swelling, as on the degree of compression produced on the mediastinum, diaphragm, and the lung of the opposite side, combined with inflammation and extravasation of fluid in the chest.

If air does not diffuse itself before the third or fourth day from the accident, there is not much chance of its doing so afterwards, because the extravasation of coagulating lymph around the wound soon shuts up the cavities of the cellular membrane.

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* Med. Observations and Enquiries, vol. iii.

† Mém. de l'Acad. Royale des Sciences, pour 1713.

In cases in which the air has not escaped from a wound of the lungs themselves, and only a moderate quantity has yet insinuated itself into the bag of the pleura, I see no objection to closing the external wound. It is true, that as soon as the air already present finds an impediment to its escape from the wound, it will be likely to diffuse itself in the surrounding cellular substance; but, in proportion as this happens, the lungs must expand to fill up the vacuum in the thorax, and the oppression of respiration be diminished. As for the external emphysematous swelling, it cannot be productive of any serious consequences, nor can it increase longer than the stock of air in the chest remains unexhausted. If the swelling be very large, (which it cannot well be without a wound of the lungs,) two or three small scarifications may be made, in order to let out the confined air.

In this particular case, the air has entered the cavity of the chest, through the external wound, at the same time, and from the same causes, as it enters the lungs through the trachea; consequently, the exact moment when the wound should be closed is at the end of an expiration.

The difficulty of ascertaining positively, whether the lungs are not superficially wounded, so as to furnish a part of the air, may sometimes make it difficult to decide, whether it is right to adopt the foregoing practice or not. When the external wound has been closed, and the difficulty of breathing increases, while the emphysema spreads, possibly the air may then escape from a wound of the lungs into the cavity of the thorax, and thence into the cellular substance in the vicinity of the external wound. In this circumstance, the air must be allowed to pass and repass through the wound, until sufficient time has been allowed for the wound in the lungs to be closed with coagulating lymph; and if the symptoms of pressure on the lungs are very urgent, and the air does not readily escape through the wound, it is proper either to make this more direct, if conveniently situated, or to make another opening into the bag of the pleura. The mode of performing paracentesis thoracis will be mentioned hereafter. In emphysematous cases, a very small but direct and pervious opening will suffice; for, if there be much air compressing the lungs, it will escape through a small, as well as a large opening, and without so much chance of inflammation as when a large one is made.

In five or six days, we may generally conclude, that the wound in the lungs is healed; and this may be known by the great diminution in the quantity of air issuing through the wound. The external wound may now be closed; and the lungs will gradually expand, as the air is absorbed.

Mr. Abernethy thinks favourably of the practice of applying a bandage round the chest in cases of emphysema, whether the lung be collapsed or not; and he considers the plan especially useful, when any of the ribs are broken.* There can indeed be no doubt, that a bandage must tend both to prevent the increase of the emphysema, and the pain which the motion of the unsupported fractured ribs would otherwise cause. But the external crackling tumour has never seemed to me a serious occurrence of itself, and its extension can always be stopped by making a few punctures, or scarifications. Some cases, which have fallen under my observation, incline me to doubt, whether bandages are ever proper, as long as air is passing from a wound of the lung into the bag of the pleura. They hinder the egress of air from the chest through the breach in the pleura costalis, and by so doing, they must have the effect of augmenting the quantity of that air which is confined within the chest, and of producing a dangerous pressure on the mediastinum diaphragm, and opposite lung. If the bandage be employed with a view of indirectly stopping the continual passage of air out of the wound in the lung itself, and of expediting its healing, I do not know that the practice is really necessary; because, if the patient live a few days, the adhesive inflammation invariably shuts up the injured air-cells, and the further escape of air is then effectually prevented. These sentiments are offered, however, with diffidence, both because several points relative to the state of the lungs in emphysema have not hitherto been explained, and because, as we have seen, the employment of bandages in these cases is sanctioned by high authorities.

When the emphysema is large, it is highly proper to give an outlet to the air, by making small punctures in various situations, and promoting its exit by frictions. Indeed, the surgeon is always to be content with this practice, unless the symptoms of compression on the diaphragm and opposite lung, and the approach of suffocation, denote that the air cannot get out of the cavity of the pleura so quickly as it finds its way into it; in which case, a small, but direct, opening is to be made into that side of the chest, on which the wound is situated.

The practice of endeavouring to exhaust the air from the chest with syringes is now generally deemed superfluous, as the air is soon absorbed; and the use and possibility of making the collapsed lung expand in this sudden way, are not credited by the best practitioners. The objection to immediately closing a wound, practised to remove the pressure of the air off the diaphragm and opposite lung, is, that this pressure may possibly recur, in consequence of the air collecting again. Yet, I am by no means certain, that the chance of a relapse is such as to justify the plan of keeping a short cannula in the wound, for about forty-eight hours. The most experienced surgeons, I believe, do not find this proceeding necessary. When the wounded lung collapses, and remains quietly in this state, its condition is the most favourable for the healing of the breach in it; and if a small direct opening has been practised, the air will rarely accumulate in such quantity again in the chest as to make dangerous pressure on the diaphragm, mediastinum, and opposite lung; and this latter will be enabled to do its functions so as to support life, till the wounded lung is healed.

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* Surgical Works, vol. ii. p. 183.

The external wound, however, never requires to be kept open longer than two days; because, at the end of this time, the wounded cells of the lung are always closed with coagulating lymph, and no more air can escape.

Unfortunately the danger in these cases is frequently owing to other causes besides the pressure of air on the lungs, diaphragm, &c.: copious extravasations of blood may exist at the same time; and inflammation of the lungs and pleura will destroy the patient, if not resisted by the good effects of copious and repeated venesection.

WOUNDS OF THE LUNGS, &c.

In wounds of the chest, it is often difficult to pronounce with certainty, whether they penetrate into the sac of the pleura; but all doubts with regard to this point are removed the moment we observe air coming out of the wound when the patient coughs. That the lungs are wounded may be inferred with nearly equal correctness in every case, in which a person coughs up blood immediately, or soon after being wounded in the chest.

It rarely happens, that a weapon enters the cavity of the thorax, without producing more or less injury of the lungs, and the danger of the latter accident is in proportion to its depth, its situation, and the size of the weapon. A wound of the lungs with a small sword seldom gives rise to much effusion of blood in the chest, unless some of the large vessels, near the roots of those organs, happen to be hurt. Putting this circumstance out of present consideration, the usual symptoms, which the patient suffers, are a spitting of blood, cough, and difficulty of breathing, succeeded by a good deal of symptomatic fever. "To discover whether the wound has injured the lungs, or not, (says a modern writer,) is a point which has given to the older surgeons great room for the employment of their ingenuity in devising possible cases, and has occasioned no small waste of time and wax-tapers in ascertaining the exit of air through the passage. A practical surgeon will require but little investigation: bloody expectoration *immediately* on receiving the wound, and the terrible symptoms of dyspnœa, sense of stricture and suffocation, insupportable anxiety and faintness, which succeed, soon enough discover the fact." The immediate danger is either from debility from hemorrhage, or suffocation from the blood flowing into the air cells and cavity of the thorax. Emphysema may also cause more or less suffering and danger. The symptoms here enumerated, whether single or in combination, may be deemed the primary effects of wounds of the lungs. Violent inflammatory affections of these organs and of the pleura subject to relapse; long and tedious suppurations and exfoliations of bones are the secondary; and, though not so rapidly fatal, are often as certainly so as the others. Diseases also may follow, which, although we cannot strictly call them pulmonary consumption, agree with it in many points, particularly in cough, emaciation, debility, and hectic. *

When the weapon is broad, and it has entered the substance of the lung, the hemorrhage is considerable; blood is immediately extravasated in the cavity of the thorax, and also flows out of the external wound; the patient has a violent paroxysm of coughing, in which some of the blood is ejected from the mouth; the air comes out of the chest with a hissing noise; and, if the outer wound be not parallel to that of the lungs, emphysema takes place. As I have already stated, the danger of such an injury depends upon the depth of the wound, and the size of the vessels which are opened. Some patients recover; while others die instantly, or in a very short space of time.

As an interesting author remarks, it is a thing really wonderful, "that the thorax, containing the heart, lungs, and great vessels, should be so often wounded with so little danger. Many, no doubt, die; but numbers escape; for a wound of the substance of the lungs is far from being mortal. The blood may suffocate the patient; the fever and pain may waste him; he may die of the inflammation, or of the oppression of the lungs; or there may be time for a large suppuration, or a lingering hectic to cut him off; but still if his wound be only in the edge of the lungs, he is in some degree safe. He is only in danger when the thick substance of the lungs is perforated, and falls into abscess; or when the root of the lungs is wounded; for, there, the large vessels of the lungs being opened, the great effusion of blood, like that from a wound of the heart itself, must kill, even by the quantity of blood lost to the general system. But besides, this blood being thrown into the trachea, deluges the lungs, the patient spits up a frothy blood; and blood, instead of air, occupies the bronchiæ; so that he struggles for breath but a few moments, and then expires." *

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* See Hennen's Obs. on Mil. Surgery, p. 395.

Let us next consider the treatment of penetrating wounds of the chest. From the previous observations it appears, that the patient may die instantaneously of internal hemorrhage, or may be cut off by the effects of inflammation within the cavity of the thorax, or by the impediment to respiration induced by air collecting in the same cavity, as explained in the foregoing account of emphysema. If (says Mr. John Bell) the patient be spitting blood, and the breathing be high, but not much oppressed, or the oppression increase but slowly, there are hopes that he may be saved. If there be no great vessel wounded in the lungs, so as to suffocate him at once, it is probable, that the smaller vessels which are opened will gradually cease to bleed; and, after four or five days of alarming cough, with bloody expectoration, this symptom will cease; and, in order that the patient may be the sooner extricated from this danger, *he must be very freely bled. Let it be the intention to reduce him very low by quick bleedings; and let these bleedings have the effect of continued internal hemorrhage, without the dangers of it.* Let them depress him to the same low condition to which the inward bleeding would most likely have brought him; and the system being emptied in this direction, there will be less danger of immediate suffocation in the lungs, and but little fear of the succeeding inflammation of those organs attaining a fatal degree. It is only by these repeated bleedings, that the patient can be saved. One thing is also very clear, that *if the surgeon bleed only when the cough and bleeding from the lungs return, he can never do wrong.* The patient, lying struggling before him, is to lose a given quantity of blood; if it be allowed to flow out into the lungs, he may be suffocated; if it be drawn from the arm, this suffocation is prevented. If he be kept low enough by bleeding, there will be no blood to spare for extravasation in the lungs.[*]

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* John Bell's Discourses on the Nature and Cure of Wounds, p. 257. edit. 3.

In all cases of penetrating wounds of the chest, and especially in injuries of the lungs, the free use of the lancet is the only thing which can be depended upon in the early part of the treatment. By it, internal hemorrhage is restrained; and by it, the dangers of the subsequent inflammation of the thoracic viscera are to be averted. The records of surgery furnish abundant proof of the necessity of such practice. The extent, indeed, to which the bleeding must sometimes be carried, is truly surprising. Le Dran bled one man fifteen times, whom he cured of a wound of the lungs; and in a similar case, Schmucker bled a patient four times a day for eight days in succession.[†] And in another instance, where a musket ball had entered the left shoulder, passed through the lungs, and come out below the left nipple, and where a profuse arterial hemorrhage took place from the mouth, threatening immediate suffocation, the bleeding was checked by repeated venesections, which were so freely practised, that two hundred and fifty ounces of blood were drawn off by the lancet in eighteen[‡] days. In every penetrating wound of the chest, and more particularly when the lungs are injured, the first bleeding should be copious. If the patient should faint, we ought not to administer cordials, but allow him to revive gradually. We should avail ourselves of this opportunity to extract, without pain, all foreign bodies within reach, whether cloth, ball, iron, wood, or splinters of bone. Should there be reason for believing, that any of these extraneous substances are lodged, and that by an enlargement of the wound, they might be extracted, the practice ought to be immediately adopted. The next object is to dress the wound itself. If it is a gunshot, a light mild dressing will be sufficient; but if incised, the lips of it should be closed at once. The patient is now to be left to repose, and he will often lie for some hours in a state of comparative ease, till the vessels again pour forth their contents, induce fresh spitting of bloody froth, and a repetition of all the symptoms of approaching suffocation. In this circumstance, the lancet must be used again without hesitation; for, as Mr. Hennen justly remarks, though in the after-treatment of a wound of the nature here described, considerable benefit may be derived from medicine, until the danger of immediate death from hemorrhage is over, "we must not think of employing any thing, except depletion by the lancet; it, and it only, can save the life of the wounded man." * When the paroxysms of pain, the sense of suffocation and hemorrhage have become more moderate, and recur at longer intervals, if the cough be very severe, we may try the exhibition of digitalis, with opiates. The lowest diet is to be prescribed. Mild saline purges and an emollient enema are to be occasionally administered, if required, and the patient kept cool, and away from every thing, which is likely to disturb him. Should we be fortunate enough to preserve our patient during the first six or seven days, a relaxation from this rigour may be cautiously admitted; but, as Mr. Hennen observes, a departure from the general plan, or an omission of bleeding on the rising of the symptoms, can only tend to accelerate the event that our efforts are designed to counteract. † When much cough and pain in the breast continue after bleeding has been fully practised, the application of blisters to the chest is a plan of the highest utility. Frequently leeches, or cupping, will also still be necessary, even after the use of the lancet has been discontinued. In some examples, the inflammation, occasioned by penetrating wounds of the chest, terminates in suppuration within the lungs, or sac of the pleura. The symptoms and treatment of which case belong to the subject of empyema.

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[*] Op. cit. p. 259, 260.

[†] Richter's Anfangsgr. der Wundarzn. b. iv. p. 327.

[‡] Thomson's Reports of Observations made in the Military Hospitals in Belgium, p. 86.

There is one circumstance, which sometimes deceives the surgeon, and makes him suppose the case to be a penetrating wound of the chest, when it is not so: a musket-ball occasionally pierces the skin and muscles on the outside of the chest, runs round the ribs, and makes its exit nearly opposite the point of entrance. Here the absence of bloody expectoration, and of other symptoms of injured lungs, together with the direction of the commencement of the track of the ball, will convey useful information to the discerning practitioner.

There is also another source of deception, as to the actual penetration of balls into the cavities of the body: this is when they strike against a handkerchief, linen, cloth, &c. a fold of which is carried by them into the wound, and when incautiously withdrawn, the bullet is not perceived. Larrey, Hen-

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* Hennen, in Obs. on Mil. Surgery, p. 398.

† Op. cit. p. 400.

nen, and other writers on military surgery relate several instances of this nature.

Wounds of the chest are sometimes complicated with the lodgment of extraneous substances in that cavity, and this sometimes without occasioning fatal consequences, either immediately or subsequently. Thus, Mr. Hennen informs us, that, in examining the bodies of soldiers, who have died of such injuries, he has frequently found pieces of wadding, of clothes, spiculæ of bone, and balls, and in one case, some charpie, used as a dressing, either loose in various parts of the lungs, or lying in sacs, formed by a deposition of coagulating lymph. In some more fortunate patients who recovered, the extraneous substances were discharged, or extracted from the wound; while in other lucky examples, they were ejected by the convulsive efforts to cough, which their irritation had * excited. The same author relates the following case to prove, that a much larger mass, than a bullet, may pass even through the lungs, without doing away all chance of recovery. A soldier was wounded through the thorax, between the third and fourth ribs of the right side. The wound was large enough to admit three fingers conically placed; and blood and air were freely discharged from it. On turning the man at the time of changing the dressings, a tumour was discovered on the scapula, from which was extracted his breast-plate, about two-thirds of which were rolled up by the force of the blow into a figure somewhat resembling a candle-extinguisher, with the musket-bullet contained within it. The other third was broken off; but it also had passed through the wound, and was extracted. The man survived the injury three weeks, and at one period afforded great hopes of recovery. The circumstance, however, of nothing particular happening in this case for the first five days, must raise doubts, whether the breast-plate and bullet actually went through the lungs; a conclusion which should hardly have been made without an examination of the state of those viscera after death.

There is less difficulty, however, in understanding how a bullet may lodge many years in the substance of the lungs, without producing inconvenience enough to indicate even its situation. We know, that after the first dangers of such injuries are over, and the balls are included in a kind of cyst, formed round them by the adhesive inflammation, they may occasion little or no disturbance in the functions, or sensations of the part. Some curious instances are also recorded, in

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* Op. cit. p. 390.

which loose balls have rolled about in the cavity of the thorax at every motion of the patient. *

When a penetrating wound of the chest is of a certain size, a protrusion or hernia of the lung may happen. If the exposed part of the lung should not be in a bleeding state, the most rational practice must be that of returning it, as speedily as possible, into the cavity of the chest again; and if necessary, even to enlarge the wound for the accomplishment of this object, without too much handling and contusion of the protruded part. Several cases are recorded, however, in which the projecting piece of lung was either removed with a knife, or ligature, and the patients recovered very well. † The projecting portion of the lung often has a livid appearance, occasioned by exposure of the part to the air, and its strangulation between the ribs. But, this affords no proof, either that the protruded part is gangrenous, or that it ought to be ‡ removed. Loyseau, when he had cut off a piece of lung, which he supposed gangrenous from its appearance, put it in water, and was surprised to find it immediately resume its natural colour. Even were the part really in a mortified state, the safer practice must undoubtedly be that of allowing a natural separation of the slough to take place.

EXTRAVASATION OF BLOOD IN THE THORAX.

The diagnosis of this case is by no means free from obscurity. The following, however, is said to be the ordinary character of the symptoms. In most instances, a wound of the lungs being the source of the hemorrhage, this occurrence will be indicated by the issue of frothy blood and air from the external wound, and by the patient expectorating blood, or coughing it up in large quantities. If, however, the bleeding be from an intercostal artery, the internal mammary, or other sources, no blood will be coughed up. Directly after the receipt of the injury, the patient generally falls into a state of syncope; and, though the bleeding may not be very considerable, he is affected with cold sweats, and his pulse is feeble and

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* See Percy's Manuel du Chirurgien d'Armée, p. 25.; Magatus's Bibliotheca Chirurgica; Hennen's Mil. Surgery, &c.

† Fabricius Hildanus Centur. 2. Obs. 32. p. 108.; Loyseau Obs. Medicinales et Chirurg. p. 25.; Ruysch, Obs. Anat. Chir. Obs. 53. In a soldier, wounded at Waterloo, the great length of a piece of protruded lung, and the manner in which it was lacerated and injured, induced me to follow this method; but the patient did not ultimately recover.

‡ Lassus, Pathologie Chir. t. ii. p. 309.

small. Notwithstanding copious and repeated venesections, practised after his revival, respiration becomes short, difficult, and laborious; and inspiration is said to be performed more easily than expiration. The patient usually lies upon the side on which the extravasation is situated; and this side seems rather larger and broader, at its lower part, than the opposite corresponding part of the chest, on which the patient cannot lie, without an aggravation of all his sufferings. When he tries to sit up in bed, he cannot remain in this position, unless he bend his body very much forwards, in order to facilitate respiration. He feels a sense of great heaviness about the ensiform cartilage, and diaphragm, attended with a frequent cough, and a most oppressive sensation of suffocation. According to Valentin, sometimes in an advanced stage of the case, a large ecchymosis, or violet-coloured spot, makes its appearance about the angles of the ribs; but this sympton is far from being either constant or restricted to the cases before us; nor did it occur in the instance of extravasation of blood in the thorax, recorded by Dr. Thomson.* In general, blood escapes from the external wound, unless the opening be very small, or situated in the upper part of the chest. Lastly, it is remarked, that the oppression of breathing from inflammation of the lungs usually subsides, or is lessened by venesection, which is not the case, when it depends upon extravasation.

If it be true, that some patients have had their breathing very little oppressed, notwithstanding an extravasation of blood in one of the cavities of the pleura, and that others have been able to lie with equal ease, either upon the sound or diseased side †, which is not common, we must conclude from these anomalous cases, that we ought not to form our opinion from any one symptom in particular, but from the assemblage of a great many. ‡

An extravasation of a large quantity of blood in the chest is unquestionably an urgent case, both because the patient is in danger of immediately dying of the inward hemorrhage, and because he is afflicted with alarming symptoms of suffocation. These latter, it is true, call for paracentesis thoracis, in order that the effused blood may be discharged, and its pressure be removed from the lungs; yet this very proceeding is itself hazardous, as it may renew the internal bleeding, of which the patient may at once perish. Thus, the surgeon has before him two dangers, equally great; viz. that of seeing his patient die of suffocation, if the operation is not performed; and that of beholding him fall a victim to hemorrhage, if an opening is made for the evacuation of the blood before the wound in the vessel is closed.

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* Reports of Observations made in the Military Hospitals in Belgium, p. 85.

† See a Case by Thomson, op. cit. p. 87.

‡ Lassus, Pathologie Chir. t. ii. p. 319.

I believe, that, in this difficult part of surgery, they are generally the most prudent practitioners who are not too officious, and hasty in taking measures for discharging the blood. Scarpa, Larrey, Assalini, and Hennen, all agree that wounds of the chest should be closed, and lightly and superficially dressed. Scarpa [*] in particular insists upon the prudence of omitting no means for effecting the immediate union of a penetrating wound, care being taken to check the force of the circulation by repeated bleedings, and every antiphlogistic remedy, in order to prevent or diminish internal hemorrhage as much as possible. If, says he, notwithstanding such treatment, blood should be extravasated between the pleura and lungs, it would press equally upon every point of those viscera, and contribute to stop the bleeding. When the wound in the lungs is healed, and the extravasated blood is not in too large quantity, it will be gradually removed by the absorbents. In the contrary case, it will form a swelling beneath the external cicatrix, and present itself externally [†]; or, then, if necessary, a counter opening may be made. In short, should the hemorrhage proceed from a vessel of inferior order, and chance to be suspended by the pressure of the effused blood itself, or the formation of a coagulum, hopes may be indulged, that the lungs will bear the compression, until the extravasated fluid is absorbed. This desirable event may be looked for with the greatest prospect of success, as the cavity, in which the effused blood lies, has no communication with the air, by which the process of putrefaction can be promoted.

If, after a time, the presence of the blood should be followed by suppuration in the cavity of the thorax, the urgency of the symptoms, arising from this new state of the case, must then determine the propriety of the operation. The danger of renewing the bleeding is now past, and no longer a consideration in the mode of treatment.

When the bleeding takes place from a vessel of the first-rate magnitude, the symptoms of suffocation are excessively urgent;

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[*] Sull' Ernie Memorie Anat. Chir. Mem. 4.

[†] Petit sur les Maladies observées à l'Hôtel Dieu de Lyon, p. 299.

and yet the danger of making an immediate opening for the discharge of the blood is proportionately great, as the hemorrhage cannot have effectually ceased. In these circumstances, many surgical writers authorize a partial evacuation of the effused blood; but I am inclined to think with Pelletan, that the cases in which such practice will answer the purpose of relieving the breathing, without being followed by a renewal of the hemorrhage, must be extremely rare.[*] After a few days, however, things are much changed, and if the patient be yet alive, but his respiration urgently interrupted by the pressure of the blood, the wound in the vessel may now be regarded as closed, and paracentesis may be done, without risk of renewing the internal bleeding.

When the propriety of discharging a collection of blood in the chest has been determined upon, it still remains for the surgeon to make choice of one of the several plans which have been proposed. These are, 1. Placing the patient in such a posture as is favourable to the exit of blood from the wound. 2. Drawing the blood out with a syringe or tubes. 3. Enlarging the wound. 4. Making an opening at a depending part of the chest.

1. We can only expect to afford relief by mere posture, when the wound is large, and direct in its course, and the blood is in a fluid state.

2. Syringes, or tubes, appear more likely to do harm by their irritation, than good in facilitating the discharge of the blood: when this is fluid, it will escape spontaneously, on a depending opening being made; and when coagulated, it cannot be drawn out with such instruments.

3. The wound should only be enlarged, when its situation is favourable for the escape of the blood.

4. When the blood is coagulated, the injection of warm water is commonly recommended; but, not to be done with too much force; and it is to be repeated every day, till the fluid returns untinged with red globules, and quite free from coagula. Of the utility of this practice, I can offer no decided opinion: but have no hesitation in expressing a strong suspicion, that whatever may be the propriety of throwing fluid into the chest, there never can be any good sense, or reason in keeping the external wound open for the performance of such experiments.

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[*] Clinique Chirurg. tom. iii. p. 240.

5. When the wound is narrow, and situated either at a fleshy part of the chest, or at its upper part, a counter opening should be made* in a depending situation, and in a manner, which will be mentioned in the next chapter.

CHAP. XXXVII.

PARACENTESIS OF THE THORAX.

THIS operation consists in making an opening into the cavity of the chest, for the purpose of giving vent to air, water, matter, or blood, by the pressure of which the functions of the lungs are dangerously obstructed.

The surgeon can hardly ever know with certainty, that a fluid is contained in the chest, so equivocal are the ordinary symptoms. If there were not this most cogent reason, still the idea of performing the present operation with such an instrument as a trocar, is deserving of the strongest reprobation. The proper instrument is a small bistoury; and the operation, when cautiously and skilfully executed, is not likely in itself to prove dangerous. Hence, though in most of the cases in which we are called upon to perform paracentesis, there may generally be considerable doubt about the presence of a fluid in the chest, yet, if symptoms are urgent, we should not be afraid of practising a small opening, as the very failure will be itself a source of useful intelligence.

When the cavity of the chest is filled with water, the disease is termed *hydrops pectoris*; when with pus, *empyema*, a word implying internal suppuration. Both water and pus, extravasated in the chest, have some symptoms common to them; such as short and difficult respiration, the lungs of the affected side being compressed by the collection of surrounding fluid. In both cases, also, expiration is even more difficult than inspiration, on account of the weight of the fluid, which strongly opposes the elevation of the diaphragm. Sometimes, when the patient moves in bed, he distinctly feels the undulation of a fluid. If this is contained in only one cavity of the chest, he cannot lie comfortably on the opposite side, because the fluid then compresses the other lung. The ribs on the affected side are observed to be more arched, than is natural, because the fluid resists their depression. When no symptoms of suppuration have occurred, the case may be deemed hydrops pectoris. The face, the integuments of the chest, and lower extremities, are frequently œdematous, and sometimes also the arm on the side affected, especially when the quantity of fluid is copious. Sometimes the dropsy of the chest is joined with the same general affection of the body. All these symptoms, however, may indicate empyema, when combined with preceding marks of inflammation and suppuration in the chest. When symptoms of acute peripneumony have taken place; and when rigors have occurred at the termination of the inflammatory fever, just before the commencement of the above kind of symptoms; it is rational to infer, that the case is empyema. I remember a man in St. Bartholomew's hospital, whose heart was pushed quite to the right side of the chest, by a collection of matter in the left bag of the pleura. The preceding existence of inflammation in the chest, the occurrence of rigors, the great difficulty of breathing, and the palpitation of the heart, quite on the right side of the thorax, enabled me to foretell the nature of the case before the man died. On opening the left cavity of the chest, a very enormous collection of matter was discovered. In this instance, paracentesis thoracis ought undoubtedly to have been performed. The pressure of the matter on the mediastinum and opposite lung must have been such, as entirely to obstruct respiration.

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* See on this subject Sabatier, in Médécine Opératoire, tom. ii. p. 234. 237.

With regard to the place, which is the most proper for making an opening into the chest, a few words are necessary, because some very excellent modern surgeons, and among them Bertrandi *, disregarding every other consideration, but that of making a depending aperture, advise us to perform the operation between the third and fourth false ribs, counting from the last, and about four or five finger-breadths from the spine. But every object can be effectually obtained by making an opening more forward, where there are no muscles, except the intercostals, to be divided. The most eligible place, is between the sixth and seventh true ribs, just at that point, where the indigitations of the serratus major anticus terminate. By placing the patient on his abdomen, this opening may be rendered very depending.

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* Traité des Opérations de Chirurgie, p. 253, 254. edit. 1784.

An incision, about two inches long, must be made through the integuments. These are first to be drawn to one side, if it be intended to close the wound immediately afterwards. The intercostal muscles are next to be cautiously divided, and a small puncture carefully made in the pleura costalis, as soon as it is exposed. The intercostal muscles must be divided closely to the upper edge of the lower rib, in order to avoid any chance of wounding the intercostal artery, which runs in a groove along the lower edge of the upper rib.

In emphysematous cases, a small puncture will generally suffice; in hydrops pectoris, it may be made somewhat larger; and, in empyema, the matter must have an opening of sufficient size to allow the fluid to escape freely, and a cannula to be afterwards introduced. Mr. Hey thinks it of great consequence to retain a cannula in the wound, until all probability of a relapse is over. *

In cases of empyema, a modern surgeon, of considerable eminence, at Paris, lays great stress on the advantage of introducing a dossil of lint into the incision, and only allowing the matter to escape by degrees: he thinks, that when the pus is discharged all at once, the atmospheric air insinuates itself into the chest, so as to keep the lungs collapsed longer than would otherwise happen, and do further harm by disposing the purulent matter in the thorax to putrefaction. †

CHAP. XXXVIII.

REMOVAL OF A DISEASED BREAST, AND TUMOURS IN GENERAL.

THE manner of removing encysted tumours has been already described.

When the breast is affected with any disease of an incurable nature, the surgeon can sometimes extirpate the malady by cutting away the whole of the diseased parts.

If the disease be of a scirrhous or malignant nature, some particularity in the mode of operating is requisite. In this

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* See Practical Observations in Surgery, p. 497. edit. 2.

† See Pelletan's Clinique Chirurg. tom. iii. sect. 4. p. 291, &c.

case, the surgeon ought not to be content with merely removing parts which are palpably and visibly diseased; he should likewise endeavour to remove a certain quantity of the substance which is in the immediate circumference of the disease. In the observations on scirrhus, in the first part of this work, I have mentioned the propensity of the skin to be affected, and the frequent extension of white morbid bands into the surrounding adipose substance. These facts greatly confirm the propriety of making a free removal of the skin, whenever it is in the least discoloured, puckered, adherent to the swelling beneath, or in any way altered; and of taking away a good deal of the fat, in which scirrhous tumours are sometimes involved. When there are no reasons for supposing the disease of the breast to be any thing else than a mere sarcomatous enlargement, the removal of the skin must certainly be considered unnecessary. When cancer recurs, the skin is the first part in which it usually makes its appearance, and the skin of the nipple in particular. Hence, many surgeons always make it a rule to remove the latter part, when it is judged proper to take away any of the integuments.

The operation is usually performed as the patient is in a sitting posture, well supported by pillows and assistants.

The pectoral muscle is to be made tense by keeping the arm back, by means of a stick, placed transversely behind the back, in front of the arms, above the bend of the elbow.

If none of the integuments are to be removed, a straight incision is to be made through them; the tumour is to be regularly dissected all round from the circumjacent parts; and lastly, its base is be detached from its connections, from above downward, till the whole is separated.

If the outer incision has been made transversely, the lower half of the swelling should be separated from its surrounding connections, before the dissection of the upper portion is begun, by which means, the surgeon will not be incommoded by the blood, from the vessels above, falling into the lower part of the wound, before the detachment of the adjacent portion of the tumour is effected. As soon as the lower half of the swelling is separated from its connections, the surgeon is to undertake the dissection of the upper half.

Such are the modes of removing all simple tumours, which are not of a malignant nature, nor of immense size.

When the tumour is of a malignant nature, and adherent to the skin and pectoral muscle beneath, the operator is to remove, at least, an inch or two of the fat on every side of the disease. The portion of the skin, intended to be taken away, must be included in two semicircular incisions; which meet thus () at their extremities; and when the base of the tumour is to be detached, the surface of the pectoral muscle, wherever it is adherent to the tumour, is also to be removed. The advantage of making the incision in the preceding manner obviously consists in enabling the surgeon to bring the edges of the wound together after the operation, so as to form a straight line, and be capable of uniting by the first intention.

The mere magnitude of a tumour frequently renders it highly judicious to take away a portion of the skin in the above method: if some were not removed, the dissection of the tumour would be exceedingly tedious; and, after the operation, the loose undistended skin would lie in folds, and form, as it were, a large pouch for the lodgment of matter.

In the extirpation of a diseased breast, the direction of the external incision must partly be determined by the shape of the tumour; but, according to Desault, there are advantages in cutting as much as possible transversely, when circumstances will allow. It is alleged, that, as the integuments are more yielding upwards or downwards, than they are in a cross direction, especially near the sternum, the transverse wound may be more expeditiously united; and that, as the great pectoral muscle only acts perpendicularly, with respect to the edges of the incision, it cannot tend to separate them. Desault thought these advantages of higher importance, than that of the easy escape of the matter at the depending angle of the wound; the reason generally assigned for preferring a perpendicular cut. *

The tumour being removed, the surgeon should examine the interior of the wound, in order to ascertain, that no indurated part is left behind; and if any hardness should be detected, it ought to be removed. The surgeon should also examine the surface of every scirrhous tumour, immediately it is taken out, for the purpose of knowing whether any of the white bands, shooting into the surrounding fat, have been divided; for, in this case, some portions of those bands must have been left behind, and ought to be taken away. Their situation may be easily known, by considering the position of the tumour before the operation.

When the dissection of a swelling will occupy a considerable time, it is always judicious practice to tie every large artery as soon as it is divided. This remark is not meant to comprehend vessels of such a diameter, that though they bleed when first cut, they do not long continue to do so, and therefore require no ligature. It was Desault's invariable method, in cutting out tumours, to tie every large artery, before he went on with the dissection.

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* Œuvres Chirurg. de Desault par Bichat, tom. ii. p. 312.

When a tumour of the breast has been entirely detached, and the hemorrhage suppressed, the stick confining the arms backward is to be removed. Then, if there be any diseased glands in the axilla, it is an excellent plan to tie the pedicles, by which they are attached on the side toward the thoracic artery, before attempting to cut the tumours completely away. It would be extremely difficult, after taking off the gland, to tie the little short artery, which enters the swelling, almost immediately it has quitted one of the thoracic arteries. The bleeding, also, in consequence of the shortness of the vessel, and vicinity of its orifice to the thoracic arteries, would be exceedingly profuse, seeming rather to arise from a wound of the latter vessels than of a small branch.

The celebrated Desault used to pursue this last practice; and I have frequently seen the late Sir Charles Blicke adopt it with success.

The operation being finished, the skin of the wound is to be relaxed, and the edges brought together with adhesive plaster. Compresses and a bandage should next be applied. If a breast has been removed, the arm on the same side should be kept perfectly quiet in a sling, until the wound is healed.

CHAP. XXXIX.

WOUNDS OF THE ABDOMEN.

ARE divided into two principal classes: in one, the solution of continuity is confined to the integuments, muscles, &c. exterior to the peritoneum; in the other, this membrane is penetrated, and frequently, at the same time, some of the viscera. Wounds, not extending through the peritoneum, are not materially different from those of ordinary textures, and are to be treated on the principles applicable to wounds in general. It is to be observed, however, that if the injury extend more deeply than the integuments, the parietes of the abdomen generally remain weakened in the situation of the previous injury, and firm as the cicatrix may appear to be, it is always liable to become the seat of a hernial protrusion*, unless it be duly supported with a bandage. Severe contusions of the skin and muscles of the belly are also sometimes followed by such an incapacity of resistance in them, that they yield to the pressure of the contained parts, and a particular kind of hernial tumour is the consequence. Thus, as Sennertus relates, a cooper's wife, who had received a violent blow on the abdomen from a piece of green elastic wood, which slipped out of her husband's hand, was afterwards afflicted with such a relaxation of the contused part, that it was converted into an enormous pouch, including during pregnancy the gravid uterus itself. The facts, to which we have adverted, strongly indicate the propriety of guarding against the formation of hernial swellings, after injuries of the abdomen, by the timely employment of a bandage.

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* See Richerand's Nosographie Chirurgicale, tom. iii. p. 322. edit. 2. Schmucker relates a case, which followed puncturing an abscess of the abdomen with a lancet, Vermischte Chirurgische Schriften, band. i. p. 197. See also a case by Wardrop, in A. Cooper's work on Crural and Umbilical Hernia, p. 60.

A spent ball, striking against the belly, may rupture the rectus muscle and aponeuroses of the abdominal muscles, so as to produce at once a protrusion of the viscera, while the integuments, on account of their greater elasticity, continue unbroken. Of this case, we have a remarkable instance recorded by Larrey.* In other examples, as the same experienced surgeon relates, the ball, in its rotation over the circumference of the abdomen, not coming against any hard projecting part, evenly depresses the parietes of the belly, and produces deeper mischief amongst the viscera, succeeded by inflammation, a copious effusion of bloody serum, in the cavity of the peritoneum, and other fatal effects.† In another case, which had a more favourable issue than those last mentioned, a cannon ball, passing with great rapidity, carried away the integuments, a piece of the left os ilium, and the attachments of the broad muscles of the belly, exposing a part of the sigmoid flexure of the colon.‡

Sometimes in consequence of punctured wounds, or violent blows, matter forms in the tendinous sheath of the rectus muscle, and when the abscess bursts, or is opened, several pints of pus may be unexpectedly discharged. The surgeon should bear in his mind the nature of this case, as there is frequently no early change of appearance in the integuments, denoting either the suppuration, or its extent. Such an abscess ought always to be opened early, and in a depending situation. The same practice is also advisable, when purulent matter collects between the layers of abdominal muscles, or between these muscles and the peritoneum. It should not be imagined, however, that, in the last case, the opening is practised chiefly with a view of hindering the abscess from making its way into the abdomen; for here, as in every other situation, the propensity of pus to get to the surface of the body, is seen to have its usual influence. We find, that although only a thin membrane lies between matter so situated and the cavity of the abdomen, the neglect to open the abscess is rarely or never followed by the entrance of any of the matter into the peritoneum. On the contrary, the part of this membrane, which adjoins the abscess, becomes thickened, and the harm resulting from the delay to make the opening, consists in a diffusion of the matter to a greater and greater extent, under and amongst the layers of the abdominal muscles.

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* Mém. de Chir. Mil. t. iii. p. 332.

† Op. et vol. cit. p. 334. See in Hennen's Mil. Surgery, p. 452., a case, in which nearly all the anterior parietes of the belly were torn away, leaving the lacerated peritoneum exposed. The injury was not immediately fatal.

‡ P. 340.

Except when a wound of the belly is large and direct, or attended with protrusion of the bowels, or the escape of feces, chyle, fetid air, bile, &c. the fact of its having penetrated the cavity of the abdomen is generally somewhat obscure and doubtful. Authors do, indeed, pretend to lay down certain means of discrimination. Amongst other things, we are advised to compare the direction of the stab with the ordinary thickness of the abdominal parietes at the wounded part, and the breadth of the wound with that of the weapon, with which the injury has been inflicted. When the instrument has entered perpendicularly at a place where the parietes are thin, and when, notwithstanding the narrowness of the end of the weapon, the division is rather broad, it is inferred that the wound is of the penetrating kind. This mode of judging, however, must generally be exceedingly fallacious, from the frequent impossibility of learning the exact direction of the thrust, or of obtaining a sight of the instrument. Also when a probe will pass perpendicularly into the wound for a certain distance, it is concluded, that the injury extends into the abdominal cavity. But it must not be positively inferred, that the wound does not penetrate because a probe cannot be thus introduced; for its passage may be stopped by the several layers of muscles, not having exactly the same situation with respect to each other, which they had at the moment of the injury. In short, unless the wound be straight, a probe can hardly be made to follow its course. I shall not dwell on the ridiculous suggestion to employ an injection, as a means of ascertaining whether the wound extends into the abdomen. Were the track of the injury rendered impervious by coagulated blood, an alteration in the relative position of the muscular layers, or other causes, the fluid could not pass into that cavity, even though the wound penetrated. There would also be a great chance of deception; for the liquid might be thrown into the cellular membrane, and seem as if it had entered the belly, when not a drop had passed in that direction. But were the inefficiency of this plan not enough to insure its rejection, its absurdity and impropriety would prohibit, with equal certainty, its adoption by any practitioner of common sense. The local symptoms, then, of a simple penetrating wound are not to be depended upon, and the employment of probes and injections for ascertaining the point, is more likely to do serious harm, than any real good. Nor can certain information always be deduced from a consideration of what may be called the *general* symptoms; a small, feeble, contracted pulse; pallid countenance; cold extremities; great and sudden debility; hiccough; vomiting; spasms; and tension of the belly. Several of these effects frequently take place in very irritable, timid, nervous subjects, without any parts being injured, in addition to the skin and muscles; and they are frequently absent when the weapon has actually entered the peritoneum. I am far from meaning to say, however, that such indisposition is to be disregarded; on the contrary, I would have the young surgeon pay particular attention to the symptoms in question, because if they do not subside very soon, we then have strong grounds for suspecting something more than the effects of a common superficial wound on an irritable, timid subject. But, in the beginning, unless the wound be large, or a protrusion of the viscera, or some such matter as the bile, chyle, or feces, escape from the external opening, there is generally a degree of uncertainty, with respect to the depth of the injury. At the same time, we are not to conclude, that the wound does not penetrate, because no protrusion, nor extravasation happens; for a narrow stab may extend into the abdomen, even amongst the viscera, without giving rise to either of these accidents.

There is in these cases a class of symptoms, which * Richter and other writers denominate *particular*, from their evincing what bowels are wounded; as, for instance, bloody urine, when the kidneys and urinary bladder are injured; vomiting of blood, when the stomach is pierced; discharge of blood with the feces, when the large intestines are wounded. Symptoms, like these, must of course throw considerable light on the nature of the accident.

With regard to our not being always able to pronounce whether a wound penetrates the cavity of the belly or not, the want of precise information on this point is of little practical importance; for, if the case be not complicated with any urgent symptoms, the treatment should obviously resemble that of a simple wound. As Richerand remarks, penetrating wounds, which are unattended with protrusion of the viscera, or extravasation in the abdomen, are less dangerous, than certain complicated wounds, which do not penetrate. If, in such a case, says he, the patient, or by-standers, were to enquire about the nature of the injury, we should avoid giving a positive opinion, informing them of the insufficiency of the means formerly practised in order to ascertain the precise depth of the wound, and explaining the objections to the probe and injections. It should also be mentioned, that bleeding, abstinence, quietude, light superficial dressings, and a strict antiphlogistic treatment, which form the safest practice for simple wounds, which do not penetrate, are the only steps which could be taken, were it entirely certain, that the injury had penetrated the cavity of the abdomen. *

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* Anfangsgr. der Wundarzn. b. v. p. 7.

If simple superficial wounds of the abdomen are unattended with any particular danger or peculiarity, the same observation cannot be made, with respect to penetrating wounds, or those which pass through the peritoneum. We have seen, that penetrating wounds of the chest give rise to a variety of dangers; these sometimes depending upon effusion of blood into the bronchiæ and air-cells of the lungs, or into the cavity of the pleura; sometimes upon the consequences of that extraordinary complication emphysema; but, more especially, upon the great tendency of the pleura and lungs to inflammation. The principal dangers of penetrating wounds of the belly arise also partly from internal hemorrhage, or extravasation of the contents of the viscera; but, in a still greater degree, from the strong disposition of the peritoneum to become affected with violent and extensive inflammation, in consequence of any injury, or irritation. With the exception of such patients as die instantly, or in a few hours from internal bleeding, &c. nine tenths of those who die from penetrating wounds of the belly are cut off by peritonitis. They who perish with extravasation of the contents of the bowels, also die in fact from peritonitis, which is generally excited partly by the injury, and partly by the irritation of the effused matter. Many authors represent the danger of a penetrating wound of the belly, as principally depending upon the entrance of the external air into the cavity of the peritoneum. But, according to my ideas, it is the wound itself, which excites the peritonitis,

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* Nosogr. Chir. t. iii. p. 335. edit. 4.

by which the patient is destroyed, and the same fatal inflammation would probably come on with equal frequency, were the wound entirely excluded from the contact of the air. The truth is, the cavity of the belly is always so completely occupied by the viscera, that the whole inner surface of the peritoneum is constantly in close contact with them, and therefore, the air cannot so easily enter within that membrane, as some writers seem disposed to believe.

OF CASES, IN WHICH THE VISCERA, THOUGH UNINJURED, PROTRUDE AT THE WOUND.

When, in the case of a penetrating wound of the abdomen, a portion of intestine, or omentum protrudes, the sooner it is returned, the more effectually will the irritation, arising from the exposure and constriction of the part, be prevented. Fomenting the protruded bowels, as is sometimes recommended, can only be considered as a ridiculous proceeding; for, what application can be so congenial to them, as the natural warmth and moisture of that cavity, into which they ought to be immediately reduced? And is it possible to suppose, that the efficacy of any artificial fomentation will make amends for the harm resulting from continuance of the bowels in a state of exposure and constriction? In order to promote the reduction, the muscles of the abdomen should be relaxed; but whether we ought to waste any time in giving clysters to empty the large intestines, previously to attempting to return the parts, is a question on which I entertain nearly the same sentiments as those delivered on the subject of fomentations. The mesentery is always to be returned before the intestine; and the intestine before the omentum; but the last protruded portion of each of these parts ought to be the first reduced.

The two index fingers are the most convenient for reducing the parts; and it is a rule to keep the portion first returned from protruding again by one finger, until it has been followed by another portion, introduced by the other finger. The second piece is to be supported in the same way, by the finger used to return it, and so on, till all the displaced parts have been put into their natural situation.

The pressure should be made in a straight direction into the cavity of the abdomen; for, when it is made obliquely, towards the edges of the wound, the parts are liable to suffer contusion without being reduced, and to glide between the layers of the abdominal muscles. When the wound is in the anterior part of the belly, pressure, made in this manner, may cause the viscera to slip into the sheath of the rectus muscle.

As soon as the reduction seems complete, the surgeon is to assure himself of it, by introducing his finger into the cavity of the abdomen, in order to feel that the parts are all freely reduced, and do not suffer any constriction, between the edge of the wound and the viscera in the abdomen.

The distention of the protruded intestine with air or feces may create a difficulty of reducing it. By pressing the contents towards the wound, however, they may be frequently made to pass by little and little, into that portion of the intestinal canal, which is within the abdomen, and the gut may then be returned. But if this plan were attended with difficulty, I should prefer dilating the wound, to handling and contusing the bowel too much.

Paré and Peter Lowe have recommended a particular method of returning the inflated intestine, without enlarging the wound: it consists in making small punctures in the bowel with a needle, through which punctures the air will escape, and leave the intestine in a collapsed state. Respecting this proposal, I believe all modern practitioners now give it a decided condemnation, both on the ground of danger and inefficacy. Blancard has published an instance, in which it failed. * The fact is, the small apertures, made with a round needle, will not serve to discharge the air, since they become closed by the mucous coat †, and the making of larger punctures, as suggested by Chopart and Desault ‡, would be far more dangerous, than dilating the wound.

When it is absolutely necessary to enlarge the wound, the dilatation should be made in a direction which will not endanger the epigastric artery; and, if possible, parallel to the muscular fibres. It would be unpardonable to use the knife more freely than necessary; as, besides putting the patient to greater pain, it would increase the chance of a subsequent hernia.

When the protruded intestine is in a state of inflammation, its immediate reduction is, beyond all dispute, the means most likely to set every thing right. Even when the inflammation has risen to a vehement pitch, a timely reduction of the displaced part, and the employment of the antiphlogistic plan, will often serve to prevent the occurrence of gangrene. The dull, brown, dark-red colour of the protruded intestine, may induce the practitioner to suppose, either that it is already

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* Collect. Medico-Physic. Part. ult. obs. 1.

† See Travers on Injuries of Intestines, &c. p. 176.

‡ Traité des Maladies Chirurg. tom. ii. p. 135.

gangrenous, or that gangrene is inevitable, and, consequently, he may delay returning it into its natural situation. But, notwithstanding this suspicious colour of the intestine, its firmness will evince, that it is not in the state of gangrene, and, therefore, its immediate reduction ought to be put in practice. The recovery of a portion of intestine, so circumstanced, is always a matter of uncertainty; but the propriety of speedily replacing it in its natural situation is a thing most certain. In case it should mortify, after being reduced, all hopes of the preservation of life are not to be abandoned, as I shall again notice at a proper opportunity.

When the omentum protrudes, and is strangulated by the narrowness of the opening, it soon contracts adhesions. Richerand has recommended us to cut off all this membrane, which exceeds the level of the integuments, and not to trouble ourselves about the remainder, which, he asserts, will act like a stopper, and hinder a future hernia. However, notwithstanding such advice, if the wound were quite recent, so that adhesions could not yet have formed, the propriety of dilating the opening, and reducing the omentum, would be unquestionable. Many objections, founded on the danger of leaving this part in a state of constriction, might be made to Richerand's proposal; but in the present state of surgery in this country it cannot be necessary to enter into them. Whenever the omentum is also sound and free from constriction, it should be reduced. In cases where this membrane, besides protruding, is in a gangrenous state, surgical writers authorise the excision of the dead part, and the reduction of the rest, each of the bleeding vessels having been first tied with a small silk ligature. I apprehend, however, that whenever the omentum has been out so long as to slough, adhesions within the wound must generally have had time to form; an event, which would embarrass the operator, and even render the safety and propriety of the attempt to reduce the living portion of the protruded membrane very questionable. The reduction of the viscera having been effected, the patient is to be laid upon his back, with the thighs bent upon the pelvis, and he must strictly avoid making any exertion, lest he bring on another protrusion. The wound is then to be closed with adhesive plaster, and the uniting bandage; but if the division be extensive, and these means ineffectual, it may be proper to have recourse to a suture. The stitches, however, should always be as few as possible. This method of sewing up wounds of the belly made a long subject, in all the old works on surgery, under the appellation of *gastroraphe*, which was nothing more than a quill-suture, practised by introducing the needle through both lips of the wound from within outwards, in order to avoid all risk of pricking the bowels. In general, the peritoneum, muscles, and integuments, were all transfixed. At the present day, surgeons talk little about gastroraphe, and we scarcely ever hear of its being performed. Indeed, in Pibrac's * dissertation on the abuse of sutures, cases are related, which satisfactorily prove, that the majority of penetrating wounds of the belly admit of being healed very well, without the employment of gastroraphe; and if we wish for still more decisive proofs of the fact, we may find them in published accounts of the Cæsarean operation, the extensive wound of which has frequently been healed by common means, when sutures had failed in accomplishing a direct union of the parts. But, though I believe, that sutures can rarely be employed with advantage for bringing together the edges of a wound in the belly, I will not assert, that they may not be essentially necessary under particular circumstances. For instance, were a large wound to be made across the abdomen, a suture might become indispensable to prevent a protrusion, or exposure of the bowels; yet, even in this case, the stitches should be as few as possible.

CASES, WITH INJURY AND PROTRUSION OF THE VISCERA.

Penetrating wounds of the abdomen, attended with protrusion of the intestines, or omentum, are always to be regarded as dangerous cases; but the danger is much more serious, when, besides being protruded, the gut is also injured. Under such circumstances, we have the authority of numerous writers on surgery, as a sanction of the practice of sewing together the edges of the wound in the bowel; a method, however, in the true utility of which surgeons now begin to have less confidence. Even the advocates of sutures here differ exceedingly, both as to the precise object in view, and the way of making the stitches. Some advise only one stitch to be made (frequently only through the mesentery); and they employ the ligature chiefly with a view of confining the injured bowel near the external wound, so that, in the event of any effusion, the matter may readily find its way outward. Other writers wish to remove the possibility of extravasation by applying numer-

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* See Mém. de l'Acad. de Chir. tom. iii. 4to. Other cases of similar success may be perused in numerous works, Journal de Médecine, tom. lxxi.; Duncan's Medical Commentaries, vol. x.; Philosophical Transactions, vol. xlvi, &c.

ous stitches, and attach little importance to the plan of using the ligature principally for the purpose of keeping the intestine near the external wound.

When the wound of a bowel is so small, that it is closed by the protrusion of the villous coat, the application of a suture must evidently be altogether needless. Supposing the breach in the intestine, however, to be somewhat larger, so as to be capable of letting the feces escape, what practice ought we to follow? As Mr. A. Cooper was performing the operation for a strangulated hernia, an aperture, giving issue to the intestinal contents, was discovered in a portion of sound bowel, just when the part was about to be reduced. The operator, including the aperture in his forceps, caused a fine silk ligature to be carried beneath the point of the instrument, firmly tied upon the gut, and the ends cut off close to the intestine. The part was then replaced, and the patient did well. Mr. Travers, who has related this fact, approves of the plan of cutting away the extremities of the ligature instead of leaving them hanging out of the external wound; for the remnant always finds its way into the intestine, and is discharged by stool, without the slightest inconvenience. *

We are next to consider the case, in which the protruded bowel is still more extensively, or even totally divided. Here the admirers of the needle have found ample scope for their ingenuity; and since very few of them have met with cases exactly of this description in the human subject, they have made a variety of experiments on animals, in order to determine the right mode of treatment. Some of these reports are favourable to the practice of sewing up the wounded bowel. Ramdohr is stated by Moebius to have actually cut off a large part of a mortified intestine in the human subject, and to have joined the sound ends together, by inserting the upper within the lower one, and fixing them in this position with a suture; the ligature being also employed to keep them near the external wound. The patient recovered, and the feces afterwards passed entirely the natural way. † About a year after the operation the patient died, when the anatomical preparation of the parts was sent to the celebrated Heister. They were preserved in spirit of wine, and exhibited, according to this last author, an union of the two ends of the bowel together, and their consolidation with a part of the abdomen. Now, it has

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* Inquiry into the Process of Nature in repairing Injuries of the Intestines, &c. p. 112, 113.

† Haller, Disput. Anat. vol. vi.; Obs. Med. Miscell. 18.

been reasonably questioned, whether the union here spoken of ever really happened. When the upper end of the bowel is introduced into the lower, the external surface of the former is put in contact with the inner one of the latter; a serous membrane is placed in contact with a mucous one. These heterogeneous structures, Richerand alleges, are not disposed to unite. The mucous membrane, when inflamed, more readily secretes a kind of mucus, which must be an invincible obstacle to adhesion. He thinks it therefore more than probable, that, in the case related by Heister, the invagination was maintained by the union of the intestine with the corresponding part of the abdominal parietes. Several experiments on living animals have convinced him, that this happens, and that the mucous membrane will not unite with the external peritoneal coat. If this be a fact, it is of course a strong argument against repeating Ramdohr's practice.* Another equally strong objection is, that the upper end of the bowel cannot be put into the lower one, unless it be separated from a part of the mesentery, and a division of the mesenteric arteries would cause a dangerous bleeding. In vain did Boyer tie seven or eight of these vessels; his patient died with an extravasation in the abdomen.† The difficulties encountered by Moebius, Dr. Smith, &c. in their attempts to repeat this experiment on animals, are related in my dictionary, and I need not therefore expatiate upon them. In short, experience is decidedly adverse to Ramdohr's practice, either in its original form or modified by the ingenious introduction of cylinders of isinglass, pasteboard, &c. Flajani assures us, that he has several times tried the artifice on patients under his care in the hospital at Rome, and that death was invariably the consequence.‡ I am of opinion, that Mr. Travers deserves the thanks of the profession, for the attention and talent with which he has investigated the subject before us; but, with respect to the question of sutures, I apprehend he has gone too far, much too far, when he declares, that, in order to avoid abdominal effusion, the suture employed should be such as will secure the absolute contact of the everted surfaces of the divided § intestine.

When the intestine has been completely divided with a cutting instrument, Scarpa * is decidedly of opinion, that Ramdohr's operation cannot be undertaken with any probability of success. But, setting out of the question this bold method, at once so amusing and captivating to the inexperienced student, this eminent professor offers a variety of arguments against sewing the intestines at all, and asserts, that *in all cases of penetrating wounds of the abdomen, attended with injury of the intestine, whether the canal be opened longitudinally, or transversely, a suture is always not merely useless, but even dangerous and fatal.* In whatever manner it is practised, says he, one cannot avoid the evils which must originate from the punctures, however few, and from the passage of the ligatures through the coats of the intestine; a part endued with exquisite sensibility, and whose external tunic is much disposed to inflame, and rapidly to communicate the inflammation to all the other abdominal viscera. It has (says Scarpa) been unfortunately proved, by the experience of several ages, that in most of the cases, in which the intestine has been stitched in penetrating wounds of the belly, the patients have died in the greatest agony. If a few escaped the dangers of this operation, it was only because in them the stitches soon cut their way out, and were voided with the feces, which continued to escape from the wound until it was entirely healed.

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* Richerand, Nosogr. Chir. t. iii. p. 344. edit. 4.

† Op. et vol. cit. p. 343.

‡ Collezione d'Osservazioni, &c. di Chirurgia, tomo iii. p. 60. 8vo. Roma, 1802.

§ Inquiry into the Process of Nature in repairing Injuries of the Intestines, p. 121. and p. 134.

All surgeons of experience, and particularly those of large hospitals, have often seen wounds of the right or left iliac region accompanied with injury of the great intestine. They may also have noticed in these examples, that, after the subsidence of the local and general inflammatory symptoms, the wound still continues to discharge feces for a certain time; but that afterwards it contracts, and the excrement resumes its usual course. These wounds almost always heal †completely: first, because the adhesion of the large intestine to the parietes of the abdomen prevents the feces from being extravasated in the cavity of the peritoneum ; and, secondly, because the ample capacity of the same bowel always presents a ready passage for the feces, notwithstanding the progressive, and sometimes quick, closure of the external opening.

If, in the instance of a penetrating wound of the belly, attended with injury of the small intestines, it were in the surgeon's power (as indeed it is) to return the bowel into the abdomen, so that the opening in it may exactly correspond to the wound in the abdominal parietes, there could not be a doubt of its quickly acquiring adhesions to the peritoneum, which lines the part around the internal orifice of the external wound. Hence, the feces would readily escape from the outer wound, and at length the artificial anus would close, and the feces resume their natural course, just like what happens in wounds of the large intestines. The narrow diameter of the small intestines would not make an insurmountable obstacle to the passage of the feces, if these were, as they usually are in this part of the alimentary canal, in a sufficiently fluid state; and besides (as Scarpa observes), is it not proved by experience, that they resume their natural course, after the cure of an artificial anus, even when a considerable noose of the small intestines has been destroyed by gangrene, and when the two ends form by their reunion a very acute angle? Scarpa then feels no hesitation in admitting the possibility of curing wounds of the small intestines without having recourse to a suture. It would not, he says, be difficult to quote examples of such cures; and one is related, which fell under his own observation. He afterwards describes the incessant pressure made by the abdominal muscles and diaphragm upon all the viscera, as the cause which makes the wounded intestine, enter the external wound, and soon adhere to its edges, instead of quitting it. When these adhesions are formed, all danger of extravasation is over. He observes, that one should neglect no remedies, internal as well as external, which may be of use in moderating the patient's sufferings, diminishing the energy of the circulation, and bringing the inflammation down to the degree requisite for the formation of adhesions. He recommends keeping the external wound open, with the same precautions, and according to the same indications, which are to be attended to in the treatment of an artificial anus. The principal object of these precautions is to let the treatment be such, that the external wound may only diminish in proportion as the evacuation from the lower part of the intestinal canal increases.

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* Sull' Ernie Memorie Anatomico-Chirurgiche; mem. iv. fol. Milano, 1809.

† See facts recorded by Larrey, in Mém. de Chir. Mil. t. ii. p. 161.

The very nature of the process, by which the reparation of wounds of the bowels is effected, is a weighty argument against the employment of a suture. Hippocrates * writes; "Si quod intestinorum gracilium discinditur, non coalescit." This aphorism, says Scarpa, taken in its true sense, is the expression of an incontestible fact. It is very true, that wounds of the intestinal canal follow, in their cicatrization, quite a different

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* Sect. 4. Aphor. 24.

course from simple wounds of the skin, muscles, or any other parts of the body. Their edges are never observed to become immediately applied to each other, and therefore, strictly speaking, they do not reunite. Their cure is altogether completed through the medium of the surrounding parts; that is to say, by the adhesions which the intestines contract with the great sac of the peritonéum lining the cavity of the abdomen, or with the productions of this membrane, which compose the external covering of the greater part of the viscera. * Littre relates, that a lunatic stabbed himself with a knife in eighteen places in the abdomen, eight of which wounds penetrated this cavity, and evidently injured the bowels. The man, however, recovered in two months; but, in another paroxysm of mania, he threw himself out of the window, and was killed. On opening his body, all the cicatrices of the intestinal canal were found adherent to some point of the surface of the adjacent viscera, or parietes of the abdomen. There was not a single one, which seemed to be formed by the direct contact of the edges of the intestinal wound with each other.

Even from the description which Mr. Travers has given of the process of reparation, in the case where sutures are employed, we may conclude, that the stitches can be of little service; for, says he, "the action of the longitudinal fibres being opposed to the artificial connection, *the sections mutually recede as the sutures loosen by the process of ulcerative* † *absorption.*" Unless, therefore, it be allowable to suppose not only that the divided portions of bowel can be sewed together so closely and accurately at every point as to remove all possibility of effusion of its contents, but that this can also be done without risk of exciting inflammation of the bowel, thus handled, dragged and stitched, I must fully agree with Scarpa, on the impropriety of thus boldly sewing up wounds of the bowels, with as little scruple as a hole in a glove.

In former editions, I have said, that if a case were to present itself, in which a protruded intestine were extensively cut, or its whole diameter completely divided, I should venture to make a single stitch with a small needle and piece of fine silk. But subsequent reflection and information make me doubt, whether even this limited employment of the needle would be necessary; and if not necessary, it would undoubtedly be improper. The following case, which as well as Ramdohr's memorable experiment, is at variance with another statement, that wounds amounting to a direct division of the canal are irreparable, and therefore invariably fatal *, furnishes an unequivocal proof, not only that an intestine may be completely cut through, and the injury not always be fatal; but that the cure may be effected without any stitching whatever of the bowel. At the assault of Cairo, in 1799, M. N... was struck by a ball, which divided the muscular parietes of the abdomen, and a portion of the ilium. The two ends of the bowel protruded, were separated from each other, and very much distended. The upper end was everted, its contracted edge strangulating the intestinal tube, as the prepuce does the penis in paraphymosis. The progress of the contents of the bowel was thus obstructed, and they accumulated above the constriction. Larrey began with making four small incisions in the constricted part of the intestine; he then passed a ligature through the portion of mesentery corresponding to the two ends of the bowel; reduced them as far as the edge of the opening, which he took care previously to enlarge; and, having dressed the wound, he awaited events. Without detailing the subsequent particulars of the case, suffice it to say, that it terminated in a few months in a perfect recovery †; a recovery which we find was accomplished, notwithstanding that part of the treatment, which consisted in making *four* cuts in the bowel, and in passing a ligature through the mesentery, must have been wrong and hurtful; and notwithstanding the complete division of the bowel had been the result of gunshot-violence, and of course must have been attended with a great deal of contusion and laceration, not only of the protruded intestine, but of the peritoneum, and other parts.

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* Acad. Royale des Science, an. 1705.

† Inquiry into the Process of Nature in repairing Injuries of the Intestines, p. 128.

It is curious that Flajani, who has so decidedly reprobated Ramdohr's practice, and mentioned facts against it from his own experience, should recommend stitching a wounded and protruded bowel in any manner; for, with the exception of his unfortunate trials of inserting one end of the bowel in the other in the cases which occurred in the hospital at Rome, he records only two instances in which he stitched the intestine, and in both these instances the bowel became gangrenous, and the patients lost their lives. ‡ We may therefore infer, with

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* Op. cit. p. 135.

† Larrey Mém. de Chir. Militaire, t. ii. p. 160, 161.

‡ Collezione d'Osservazioni, &c. di Chirurgia, t. iii. p. 35—41. In one case, the protruded bowel was a portion of jejunum; in the other, a piece of colon.

Mr. John Bell, "that if there be a work of supererogation in surgery, as I believe there are but too many, surely this of sewing an intestine is one.*

Every reflection, then, which I can make on this subject leads me to adopt Scarpa's sentiments, in relation to sutures, and the indications, which should be fulfilled. The chief indication, and that, on which the patient's safety mainly depends, consists in keeping the external wound open, in order that the feces may find a ready outlet. The wounded bowel soon contracts adhesions to the inner lips of the wound of the belly, and then we have nothing to fear from an extravasation of intestinal matter in the cavity of the peritoneum. Afterwards, in proportion as the feces resume their natural course, the external wound is to be allowed to diminish, and entirely heal up.†

In every instance of a penetrating wound of the abdomen, attended with injury and protrusion of a portion of the intestinal canal, the displaced part is to be reduced, whatever we may choose to do in respect to the free or limited employment of stitches, or their absolute rejection. The reduction should be performed as speedily as possible, before the bowel has suffered much from exposure, constriction, &c. and also before any adhesions have formed at the inner orifice of the external wound; adhesions, which would make the reduction of the protruded part impracticable. Of course, when the wound is so small, that the reduction cannot be effected without handling and bruising the bowel immoderately, it ought to be carefully enlarged with curved bistoury, guided on a director. Indeed, according to Scarpa's principles, one would suppose, that the wound, if not free, should always be dilated, as by this means the ready escape of any extravasated matter would be insured. The rest of the treatment consists in the rigorous adoption of antiphlogistic measures, more especially copious and repeated venesection, with a view of counteracting the danger of peritoneal inflammation. With respect to the dressings, they cannot be too light, simple, and superficial, except when the stoppage of evacuation in the natural way, and the issue of the intestinal contents from the breach in the bowel, are such as to lead us to adopt particular means, with a view of guarding against a premature closure of the external wound.

The pressure of the elastic bowels, and of the diaphragm, and abdominal muscles, not only frequently presents an obstacle to the wide diffusion of extravasated matter, but often propels it towards the external wound.* We can conceive no power capable of overcoming the resistance so produced to the extensive dispersion of extravasated fluids in the cavity of the abdomen. Numerous cases are on record, of persons being stabbed, or shot, through the body, without any effusion in the abdomen or other very serious consequences. In some few of these instances, the bowels perhaps might have eluded the ball, or point of the weapon†; yet, it is highly probable, that, in most of these examples, the bowels were injured, and that an extravasation of the intestinal matter was impeded by the opposite pressure of the adjacent viscera. In many of the cases, the intestines were known to be wounded.‡

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* Discourses on the Nature and Cure of Wounds, edit. iii. p. 320.

† Scarpa sull' Ernie Memorie Anatomico-Chirurgiche, mem. 4.

PENETRATING WOUNDS, ATTENDED WITH INJURY OF THE VISCERA, BUT NO PROTRUSION.

A wound of the intestines is indicated by the discharge of blood with the stools, and sometimes by the escape of fetid air, or of intestinal matter from the external wound. Such an injury, however, when the wounded bowels lie concealed in the belly, does not always admit of being immediately known with certainty. In the majority of examples, there is at first no escape either of air, or of the contents of the bowels, from the external wound; the quantity of blood, voided per anum, may be inconsiderable; and however this may be, none at all will generally be discharged downwards, until a certain time after the accident. Wounds of the small intestines, especially of the duodenum and jejunum, are indeed usually followed by great anxiety, paleness of the countenance, syncope, cold perspirations, and a small intermitting tremulous pulse; but, these symptoms are far from being unequivocal, and they cannot be said to furnish any positive information, because a superficial cut, or unimportant stab, frequently causes similar indisposition in subjects of nervous, irritable, or timid habits. Our inability, however, to say assuredly in every case, whether the bowels are injured or not, is a thing of no practical importance; because, when the nature of the accident is not clearly manifested by some peculiarity or severity of the symptoms, the case ought invariably to be treated on common, simple, antiphlogistic principles; and also when circumstances leave not the smallest doubt of the intestines being hurt, the same treatment is the only rational plan, which can be pursued. Wounds of the small intestines are reckoned much more dangerous than those of the large; and the nearer the injury is to the pylorus, the greater is the risk. Such cases are also much more frequently, than injuries of the large intestines, the cause of extravasation. In the latter examples, the symptoms are generally milder, and either the passage of the intestinal contents outward through the wound more easy and certain, on account of the bowel being more fixed, than the rest of the intestines; or the passage of the intestinal matter towards the anus more ready, by reason of the greater capacity of the cœcum, colon, and rectum.

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* On this subject, I would particularly recommend the reader to consult two essays by M. Petit le Fils, one entitled "Essai sur les Epanchemens et en particulier sur les Epanchemens de Sang;" the other, "Suite de l'Essai sur les Epanchemens," in Mém. de l'Acad. de Chir. tom. ii. and iv. 12mo.

† "It frequently happeneth, that a sword passeth through the body, without wounding any considerable part." Wiseman.

‡ Recoveries of this sort are recorded in Wiseman's Surgery, p. 371. Œuvres de Paré, liv. x. chap. 35.; La Motte, Traité Complet de Chir. Albucasis, lib. ii. cap. 26.; Ravaton, Traité des Playes d'Armes à Feu, chap. 6, &c. &c.

There are several other facts highly interesting, and absolutely necessary to be remembered in considering wounds of the bowels: my limits, however, oblige me to pass over the rest of this subject with as much brevity as possible; for which, the fuller account in my dictionary will also afford a just excuse. Were it not for these considerations, I should have felt myself obliged to enter into explanations of the particular appearances presented, as well by punctured wounds, as by transverse and longitudinal cuts in the intestinal canal; and to comment on the circumstance of small punctures being obliterated by the protrusion of the villous coat. I should also have had to point out the results of Mr. Travers's experiments on dogs, proving that, in these animals, a division of the small intestine as far as the mesentery, is always fatal; that generally in wounds of the intestinal canal, the retraction, immediately following the injury, is a chief obstacle to its reparation; and that longitudinal wounds of the bowels are more easily repaired, than such as are transverse. This tendency of the two portions of a divided bowel to recede from each other tends to shew, that the only means of spontaneous reparation consist in the formation of an adventitious canal, by the encircling bowels and their appendages.

In the preceding part of this chapter, I have adduced many arguments, which throw doubt on the propriety of sewing up a wound in a protruded bowel; but, when the injured intestine lies in the cavity of the belly, the most ignorant and rash surgeon, the greatest admirer of needles, would never think of ripping open his patient for the sake of performing so cruel and fatal an experiment. In fact, as I have already stated, we rarely know at first, that the bowel is injured; for extravation, as will be presently related, is not the most usual consequence of a wound of an intestine; when it happens, the extravasated matter does not always flow out of the external wound, and indicate the nature of the accident; and if an extravation should become manifest in a later stage of the case; it would then be impossible to get at the wound of the bowel, on account of the adhesions, which generally form with surprising rapidity. Even if the wound of the intestine were known to exist directly after the receipt of the injury, and a suture were not objectionable, on grounds already detailed, it could not be applied, without enlarging the external wound, searching for the wounded entrail, and drawing it out of the cavity of the abdomen. By these steps, a wound, not at first essentially fatal, might be so altered for the worse, as to leave no possibility of recovery. When an intestine is first found to be wounded, from the occurrence of extravasation a day or two after the injury, a suture is entirely out of the question, as by this time, the part is entirely fixed in its situation by the adhesive inflammation, that salutary process, which also circumscribes the effusion, and throws out an effectual partition between the extravasated fluid and the general cavity of the peritoneum.

When the wound of the intestinal canal is situated in the abdomen, closely behind the external wound, a suture is also unnecessary, because if care be taken to keep that opening from closing too soon, the contents of the gut will be discharged outwardly, and there will be no reason to fear an effusion of them among the viscera. Nor is there any cause to fear, that the wounded bowel will change its situation, and become more distant from the outer wound. Nothing, except violent motion of the body, could cause so unfavourable an accident, and this ought always to be avoided. The adhesions, which take place in the course of a day or two, at length render it impossible for the bowel to vary its situation.

In a penetrating wound of the abdomen, whether by gunshot or a cutting instrument, if no protrusion of intestine takes place, the lancet, abstinence, and quietude, should be our chief dependence. In short, as the main danger is inflammation of the peritoneum and bowels, the rigorous adoption of the antiphlogistic plan of treatment is indispensable. The pain and tension which usually ensue, must be relieved by leeches, fomentations, and the warm bath; and if any purgative medicine be given, (which, however, I think should never be done before time has been afforded for the formation of adhesions,) it should be of the mildest description possible. Castor oil is perhaps the safest which can be employed. In these cases, indeed, clysters are generally to be preferred to any other means of emptying the bowels. By the simple observance of an antiphlogistic plan, wounds, in which several folds of the bowels were hurt, have been happily cured. Authors abound with instances of this kind. One has been already cited in this chapter from the practice of M. Littre. Garengeot and La Motte record others; and Mr. Hennen assures us, that he has seen several: one case was the recovery of a soldier, who had been shot through the abdomen with a ramrod at the siege of Badajos, in 1812. The instrument entered the front of the abdomen, and actually stuck in the vertebræ, from which it was not disengaged without the application of some force. *

Patients, who have recovered from wounds of the bowels, should, for a long while afterwards, be extremely temperate and cautious in their diet; and above all things, avoid taking any kind of flatulent, stimulating, indigestible food. They must also be very careful to keep the bowels regular.

It is alleged, that the intestine generally undergoes a diminution in its diameter at the place, where the wound was situated. When this constriction is inconsiderable, no inconvenience is usually felt from it, except sometimes colic pains, chiefly after the patient has been imprudently taking food, calculated to produce flatulence. These pains commonly go off entirely after a certain time, and never return; a circumstance which leads Richter to suppose, that the bowel in time regains its original diameter †; an observation, of the truth of which I have had no opportunity of judging. According to the same author, a more considerable constriction of the intestine, after the reparation of a wound in it, has been known to terminate in a fatal cholera morbus; nay, it is asserted, that the contents of the canal may accumulate above the contracted part, and the bowel itself burst. ‡

In all cases of penetrating wounds of the belly, the dressings should be light, simple, and superficial. If excrementitious

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* See Hennen's Obs. on Military Surgery, p. 436, 437.

† The nature of the process, by which the continuity of the intestinal canal is restored in cases of mortification of the bowel, will be described in the chapter on hernia; and we shall there notice the kind of difficulty occasioned to the passage of the contents of the bowel, and the changes by which the obstruction is frequently at last more or less obviated.

‡ See Richter's Anfansgr. der Wundarzn. b. v. p. 62.

matter be discharged from the opening, the utmost attention must be paid to cleanliness. We should also recollect the precept inculcated by Scarpa, viz. that the external wound should only be allowed to close, in proportion as the feces resume their natural course, with ease and regularity.

Sometimes the intestinal matter continues to be discharged for a considerable time from the wound, and even during the rest of the patient's life, either through a fistula, or an artificial anus. In general, however, this kind of affliction gradually ceases. In almost every collection of cases, we may find examples fully proving, not only that simple stabs of the bowels in the end get well, without leaving a permanent annoyance of this kind, but that large portions of the bowels may even be destroyed by gangrene, and yet in the end the continuity of the intestinal tube be completely re-established. From the facts quoted in this chapter, it would also appear, that a complete division of a bowel is neither certainly fatal, nor necessarily followed by an irremediable artificial anus.

Balls shot into the abdomen are occasionally discharged with the stools; facts illustrative of which occurrence are common enough in the annals of surgery. *

EXTRAVASATION.

An occasional consequence of a wound, which penetrates the abdomen, is an extravasation of the cavity of the peritoneum. The extravasated matter may be indigested food, chyle, the succus pancreaticus, feces, bile, urine, blood, &c. according to the nature of the injured parts. Fortunately, this kind of accident is far less frequent, than an inexperienced surgeon would apprehend, or than our hearing so much of the cavity of the abdomen would lead us to expect. But more strictly speaking, no empty space exists within the animal body; and all the parts contained in the abdomen are in close contact with each other, and with the inner surface of the peritoneum. Hence, except under particular circumstances, though the bowels may be wounded, extravasation is generally prevented altogether; or when it does happen, is seldom extensive and diffused, the effused matter commonly lying all in one mass.

If, immediately after a wound of the belly, and of its contents, it is the compact state of the contained and containing parts which at first hinders extravasation, it is that salutary process,

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* See particularly Schmucker's Vermischte Chirurgische Schriften, band. ii. p. 148; and Hennen's Obs. on Military Surgery, p. 458.

the adhesive inflammation, which afterwards renders the occurrence quite impossible; or bounds and circumscribes the effusion, if it should have already taken place. In fact, all the surfaces, in contact with each other, and surrounding the track of the wound, become generally so intimately connected together, by the adhesive inflammation, that the wound forms a sort of canal, entirely destitute of all communication with the cavity of the peritoneum; and the rapidity with which such adhesions occur is often very great.

When an extravasation is diffused in various degrees over the abdomen, Richter thinks we may generally account for it by the patient having been moved about too much; or by his having suffered violent spasmodic contractions of the intestines, arising from the irritation of the extravasated matter. Urine and bile are more frequently extensively dispersed among the convolutions of the viscera, than blood, chyle, or any other effused fluid.

According to the investigations of Mr. Travers, the following are the only circumstances, in which an effusion of the intestinal contents can happen. If the gut be full, and the wound extensive, the surrounding pressure is overcome by the natural action of the bowel tending to the expulsion of its contents. But, in defect of either of these states, effusion cannot follow. When, however, air has escaped from the bowel, or blood has been extravasated in quantity within the abdomen, at the time of the injury, the resistance, made to effusion, will be less effectual, although the pressure of the sides of the abdomen is the same, as such fluids will yield more readily than the solids naturally in contact with each other. Effusions are also stated more generally to follow ruptures of the bowels by blows, or falls upon the belly, than ordinary penetrating wounds. *

When an extravasation is perceived, in the first instance, a part of the wound is to be left open, and the posture of the patient is to be so regulated as to make the wound as depending as possible, in order to promote the escape of the effused fluid. In case it should not be perceived till after the wound has been dressed, it is directed to remove the means employed to close a part of it, and to place the patient in a proper posture, with a bandage applied round the body. When internal hemorrhage is suspected, cold washes and venesection are recommended.

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* See an Inquiry into the Process of Nature in repairing Injuries of the Intestines, &c. p. 25—36.

According to surgical writers, when symptoms of irritation exist, attended with local inflammation, pain, and a fluctuating tumour, denoting the seat of the extravasation, the effused fluid is to be evacuated by a puncture.* In the Memoirs of the Academy of Surgery may be found observations, recorded by Petit and Le Vacher, illustrating the propriety of such treatment.

When there are no symptoms denoting the exact seat of the extravasation, the employment of antiphlogistic means, a suitable posture, and the introduction of a tube into the wound, are the measures, to which we are then advised to have recourse. For my own part, I would restrict the plan of treatment to averting inflammation, as, in this circumstance, no benefit can be derived from posture, nor from a tube, which does not actually reach the effused fluid; and the former must often be irksome, the latter always irritating. Venesection should be freely and repeatedly performed; the belly fomented two or three times a day; and only the lowest regimen allowed. A bandage should also be applied rather tightly round the body, as a rational means of promoting that compact state of all the parts contained in the abdomen, by which the ill consequences of extravasations are so materially diminished.

In gunshot-wounds, musket balls sometimes pierce and lodge in the bladder, in which circumstance, a surgical operation, resembling lithotomy, will become necessary, as soon as the dangers of the first injury are past.† In wounds of the bladder, a great deal of difference in the degree of danger will depend upon whether this organ happens to be full of urine at the time of the accident, and whether the injured part of it is one, over which the peritoneum is reflected. The principal source of danger, however, in all cases, arises from the risk of the urine becoming effused, and exciting inflammation and gangrene of the peritoneum, bowels, cellular membrane, and, in short, of every part with which it comes into contact. The obvious indications are to make a free and depending outlet for any urine already effused; to prevent a further extravasation by the continual use of an elastic gum catheter; to keep down and diminish inflammation by copious bleeding and low diet; and to avoid every sort of dressing at all likely to irritate or obstruct the wound itself. The best applications, indeed, are light, simple pledgets, with the strictest attention to cleanliness. The cases, in which very considerable wounds of the bladder have terminated favourably under such treatment, are now very numerous. * Wounds of the bladder are often rendered more dangerous by being complicated with injury of the intestines.

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* Richter's Anfansgr. der Wundarzneykunst, band. v. p. 58.

† See Larrey's Mém. de Chir. Mil. t. iv., and Hennen's Mil. Surgery.

CHAP. XL.

PSOAS ABSCESS.

THIS signifies a collection of matter, which usually forms behind the peritoneum, in the cellular substance surrounding the psoas muscle. The origin of this disease is not, in general, attended with any symptoms of acute pain and inflammation, nor with any febrile disturbance of the constitution. There is a dull uneasiness in the region of the loins; but this, so far from leading to a suspicion of the nature of the disease, is usually regarded as rheumatic. The matter is formed slowly, and imperceptibly, and occasions, at first, no manifest swelling, nor fluctuation, and no material symptom whatever, excepting the uneasiness in the loins, and a slight weakness of the thigh and leg on the affected side.

While the abscess is attended with no external tumour, the diagnosis is always difficult, and any opinion, founded en the existing symptoms, is very undeserving of implicit confidence.

The outward swelling, at length occurring, may take place in various situations. For the most part, the matter descends by its own gravity, in the course of the psoas muscle, passes forward under Poupart's ligament, and occasions an external, fluctuating tumour, quite free from pain and inflammation. The exemption from the latter circumstances is a clear indication, that the matter is not originally formed at the place where it first makes its appearance. The enlargement of the swelling, when the patient draws in his breath; its diminution in an horizontal posture, and on pressure being made; and lastly, the fluctuation perceptible to the surgeon's fingers,

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* Such facts are abundant in Larrey's excellent work, especially the 4th vol. Flajani relates another case, in which the means were restricted to antiphlogistic remedies, Collez. d'Osservazioni, t. iii. p. 59. Thomson saw fourteen examples of wounded bladder recovering. See Obs. in the Mil. Hospitals in Belgium, p. 108, &c.

when the patient coughs, are circumstances which, combined with the other preceding complaints, clearly evince the nature of the case.

The swelling in the groin seldom becomes exceedingly large, because the matter in general soon insinuates itself beneath the femoral fascia. In some instances, it descends as far as the knee, and forms there a prominent swelling. Sometimes it makes its way downward, into the pelvis, and occasions a swelling in the neighbourhood of the anus. Sometimes it tends towards the loins and sacrum, giving rise to a swelling exactly in the place where abscesses often make their appearance in the disease of the hip-joint. In a few instances, the matter causes a swelling in the vicinity of the vertebræ; and, less frequently still, it makes its way through the abdominal muscles, and occasions a tumour at some part of the abdomen.

The disease, even before it bursts, or is opened, is frequently attended with loss of appetite, weakness, nocturnal sweats, and other hectical complaints.

Lumbar abscesses are sometimes attended with a carious state of the vertebræ. The affection of the bones is by some considered as a cause; by others, as an effect of the rest of the disease.

The causes of the psoas abscess are frequently involved in great obscurity. Sometimes, the disease has been preceded by a violent strain of the loins; but, very commonly, we cannot trace any valid reason for its occurrence.

In considering suppuration, I have recommended, as a general rule, liable to particular exceptions, that acute abscesses ought to be allowed to burst spontaneously. With respect to chronic abscesses, an opposite piece of advice seems proper, and surgeons may generally decide to open them, as soon as their existence is known. If not opened, they do not make their way through the skin for a very long time, during which period, the quantity of matter is continually increasing, and the cavity of the cyst becoming larger and larger. Psoas abscesses cannot be opened before the swelling occurs, on account of their very deep situation, and the difficulty of knowing their existence with certainty. But, when the swelling and fluctuation are evident, the sooner the matter is discharged the better.

Experience shows, that, when a psoas abscess is opened in the common manner, death in general follows sooner than when the swelling is allowed to burst of itself. The formation of a large opening, but particularly the aperture being afterwards left unclosed, causes an inflammatory affection of the whole cyst of the abscess, and the most violent description of constitutional disturbance. The discharge is profuse, thin, and fetid. The patient's pulse becomes small, rapid, and irregular; copious perspirations, unremitting diarrhœa, and even delirium ensue, and death very commonly closes the scene.

Hence, several practitioners * are in favour of letting lumbar abscesses burst spontaneously. But, though I must assent to this practice being better, than making a large puncture, and leaving it open, yet I have to remark, that whoever expects the symptoms to be mild on the abscess bursting of itself, will generally find himself deceived. Violent irritation of a hectical constitution usually ensues, and the patient mostly falls a victim.

On the other hand, I have had so many opportunities of appreciating the practice, recommended by † Mr. Abernethy in these cases, that I must consider it, in the present state of surgery, as the only one warrantable. By it, the severe symptoms, under which patients used formerly to perish, when the abscess burst, or was punctured, and the opening left unclosed, are for the most part avoided, and recoveries are rendered more frequent.

This gentleman's method is to open the tumour with a broad abscess lancet, observing to introduce the instrument somewhat obliquely. Such an opening is generally sufficient for the discharge of the coagula, which are commonly blended with the contents of lumbar abscesses.

The abscess being completely emptied, the lips of the orifice are to be brought together by means of lint and sticking plaster, in the same way as after phlebotomy, and a compress and bandage are to be applied. The wound generally heals, without trouble.

The matter of course collects again, and, regularly as it is secreted, descends to the lower part of the cyst, on which account the upper part of the cavity will remain a good while undistended, and have an opportunity of contracting. When the integuments are again sufficiently elevated to allow a puncture to be made, without hazard of wounding the subjacent parts, the abscess is to be emptied again, and the wound healed, in the manner above described. Thus the operation is to be repeated as often as may be necessary.

By this method, the cyst of the abscess, particularly its upper

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* Pearson in his Principles of Surgery, p. 112. Pelletan in his Clinique Chir. tom. iii. p. 322.

† On Chronic and Lumbar Abscesses, in Surgical Works, vol. ii.

portion, is not allowed to be distended, and its cavity gradually diminishes in size.

In conjunction with this treatment, attempts may be made to promote the absorption of the matter by electricity; giving two or three times a week a scruple of sulphate of zinc as an emetic; and by blistering the integuments. Care should be taken not to apply the blister at a part where it may be necessary to make a puncture in the abscess. A discharge should be kept up from the blistered surface by means of the savine cerate. When there is reason to suppose the vertebræ diseased, issues are sometimes beneficial.

When the abscess seems disposed to burst by ulceration, the event may sometimes be prevented by a timely puncture made at a part of the tumour, where the integuments are free from inflammation.

CHAP. XLI.

PARACENTESIS ABDOMINIS.

THIS operation consists in making an opening into the cavity of the peritoneum, for the purpose of discharging the fluid collected there in dropsical cases.

The proper instrument for making the opening is a trocar, with a cannula, through which the fluid can readily escape.

Not many years ago, it was the invariable practice to introduce the instrument at the central point of a line, drawn from the umbilicus to the anterior superior spinous process of the os ilium, and on the left side, in order to avoid all risk of injuring the liver.

Modern practitioners usually prefer making the puncture in the linea alba for several weighty reasons. The first is, that in the other method, you are not sure of introducing the instrument in the exact situation of the linea semilunaris, and consequently may unnecessarily wound the thick muscular parietes of the abdomen, instead of merely a thin tendinous part. Another reason is, that in the attempt to tap in the linea semilunaris, the epigastric artery has sometimes been wounded by very skilful men. In dropsical cases, the rectus muscle is frequently much broader than in a healthy subject; and, as it always yields to the distention of the fluid in a greater proportion than the lateral layers of muscles, the above measurement is very likely to cause the wound to be made near the course of the epigastric artery.

When the operation is to be performed in the linea alba, the instrument should be introduced about two or three inches below the navel.

As soon as the trocar meets with no further resistance, it is not to be pushed more deeply without any object, and with a possibility of injuring the viscera. The stilet is now to be withdrawn, and the fluid allowed to escape through the cannula.

In consequence of the sudden removal of the pressure of the fluid from the viscera and diaphragm, patients are very apt to swoon, and even become affected with dangerous symptoms. In order to prevent these unpleasant occurrences, the abdomen is to be compressed with a bandage or belt, during the discharge of the fluid, and is afterwards to be covered with a flannel compress, and tightish roller.

CHAP. XLII.

HERNIA.

BY the term *hernia*, surgeons ordinarily imply a preternatural tumour, occasioned by some of the viscera of the abdomen being displaced out of that cavity.

The disease in common language is called a *rupture;* and this appellation seems to have proceeded from an erroneous idea formerly entertained, that the case was always attended with a laceration of the peritoneum. The moderns, with more accuracy, insist that, in ordinary cases, there is only a dilated state of the parts, in which a hernia is included.

In general, those viscera of the abdomen, which are the most moveable, are the most liable to protrusion. Hence, the omentum and intestines, which are loose and unfixed in the cavity of the belly, are met with in almost every hernia, while the stomach has seldom been observed in such a tumour, and still more rarely the spleen * and liver. The pancreas and kidneys are also too much fixed ever to be propelled outward. The liver being connected with the diaphragm, is not subject to complete displacement, though a portion of it has been noticed in large herniæ at the navel.* The uterus †, ovaries‡, and bladder §, however, are liable to protrusion.

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* Ruysch, Advers. Dec. 2.

But, putting out of present consideration less common cases, in which occasionally few of the abdominal viscera have not been more or less protruded, the usual contents of a hernia are either a portion of intestine or omentum, or of both these parts together.

When intestine alone is contained in the hernia, the case is termed an *enterocele*; when omentum alone, *epiplocele*; and when both are included in the tumour, it is named an *entero-epiplocele*.

When a hernia contains a part of the stomach, liver, bladder, &c. it is sometimes named accordingly, *gastrocele*, *hepatocele*, and *cystocele*.

Besides this division of herniæ into several kinds, deduced from the nature of their contents, there are other surgical distinctions, derived from their situations. Thus, when any of the contents of the abdomen slip through the abdominal ring into the groin, the case is termed a *bubonocele*, or *inguinal hernia*; and when the parts descend lower, into the scrotum or labia pudendorum, the hernia is called an *oscheocele*. The name of *femoral*, or *crural hernia*, is applied to that, which occurs below Poupart's ligament, and is most frequent in women. When any of the abdominal viscera are protruded at the navel, the tumour is termed an *umbilical hernia*, or *exomphalos*. The hernial tumours, which take place below the pubes, near the attachment of the superior head of the triceps and pectineus, are called *herniæ of the foramen ovale*. Sometimes, the hernial tumour projects into the vagina, and is named accordingly hernia vaginæ; while such protrusions as happen at parts of the abdomen, not comprehended in the preceding account, are called *ventral herniæ*.

One very particular case is termed *hernia congenita*. It exists from the time of birth, and in it some of the abdominal viscera are actually lodged in the tunica vaginalis, in contact with the testicle. Haller and John Hunter seem equally deserving of the honour attached to the explanations of the nature of this particular case.* The disease is produced in consequence of a piece of intestine, or omentum, slipping into the tunica vaginalis, before the natural communication between the cavity of this membrane and that of the abdomen is obliterated in the young subject.

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* Gay, Nourse, and Bohnius, see Pott's Chirurg. Works, vol. ii. p. 121. edit. 1808.

† Chopart and Desault, Traité des Mal. Chir. tom. ii. p. 3.; also Ruysch, Hildanus, and Sennertus.

‡ Pott, vol. ii. p. 126.

§ See particularly Récherches sur la Hernie de la Vessie par M. Verdier, in Mém. de l'Acad. de Chir. tom. ii.; Pott's Works, vol. ii. p. 206. edit. 1808.; Mery, Obs. sur differentes Maladies, in Acad. Royale de Sciences, an. 1713; Ruysch, Obs. Anat. Chir. Centuria, Obs. 98.; Keate's Cases of Hydrocele, &c. &c.

A few years ago, Mr. Hey, of Leeds, discovered a new species of hernia congenita, to which he gives the epithet *infantilis*, as it can only exist while the parts retain the state peculiar to early infancy. The particularity of the hernia congenita infantilis consists in the hernial sac being contained in the tunica vaginalis of the testicle. This case differs from the common scrotal rupture, in which the hernial sac lies on the outside of the tunica vaginalis, and also, from the common hernia congenita, in which the protruded viscera are in contact with the testicle, and have no hernial sac, except the tunica vaginalis.†

In common cases, the contents of a hernia are always included in a complete membranous pouch, which is derived from the peritoneum. This membrane, as every novice in surgery knows, lines the whole cavity of the abdomen; and when any viscus protrudes out of the belly, it necessarily carries before it a portion of the elastic bag, in which it is naturally included. Such is the simple manner, in which a *hernial sac* is formed. The hernial sac is generally described, as becoming thicker and thicker, and as presenting in herniæ of long standing, the appearance of a dense thick membrane, composed of several layers, easily separable by dissection. But Scarpa assures us that, in the majority of cases, the hernial sac, strictly so called, does not become perceptibly thickened, and that whatever may be the magnitude, or long-standing of a scrotal hernia, the sac is generally not different from the rest of the peritoneum. The differences, remarked in the thickness and strength of the coverings of a hernia, he says, are not to be referred to the hernial sac; but to certain investments, which are external to it, as for instance, the elongation of the fascia lata, the muscular and aponeurotic sheath of the cremaster, and cellular substance, which is on the outside of the hernial sac. The thickening of these various investments is, no doubt, the effect of the pressure, which are continually made upon them by the displaced viscera.* Schmucker† informs us, that he met with a very thin hernial sac in a man, who had been afflicted for twenty years with a large scrotal hernia; but, as Scarpa observes, this fact, which is related as singular, is on the contrary very common. Le Blanc‡ and others have noticed that, in crural herniæ, which are not covered by the cremaster muscle, the hernial sac is always thin, and completely similar in structure to the healthy peritoneum. Scarpa infers, therefore, that, whenever in operating upon a recent inguinal hernia, of moderate size, the hernial sac has been found of a thin texture, like the peritoneum, immediately below the cremaster muscle, the cellular substance which covers it, must have been divided, without having been perceived; and on the other hand, that, in operating upon old scrotal herniæ, of great size, the cremaster and subjacent cellular membrane, which in such cases acquire considerable thickness and strength, have been mistaken for the hernial sac.

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* See Haller's Programma, herniarum observationes aliquot continens, Goettingen 1749. His Opuscula Pathologica, and also Opera Minora, tom. iii. The programma appears to be by far the earliest publication on the subject. Hunter's Med. Commentaries seem not to have made their appearance till 1762.

† Hey's Practical Observations in Surgery, p. 230. edit. 2.

The foregoing statement, however, is allowed by Scarpa to have exceptions; and he admits, with the generality of other surgical writers, that, in certain instances, the hernial sac itself becomes much thicker than the rest of the peritoneum; especially when the hernia, after being for a long while reduced, protrudes again, and is not kept up; when the tumour has been repeatedly affected with inflammation; or when there are extensive adhesions between the hernial sac and its contents.§ When the hernia is very large, the hernial sac sometimes grows thinner, instead of becoming thicker, in proportion to the size and duration of the tumour. This diminution of the thickness of the sac and more external parts may take place in so considerable a degree, as to render the convolutions, and vermicular motion, of the bowels visible through the skin. When the hernial sac has been burst by a blow, the contents of a rupture may also lie immediately under the integuments.‖

In an epiplocele, as Le Dran observes, there is nothing to be felt, except a doughy softness, which neither absolutely yields to the touch, nor very sensibly resists it.* The tumour has a flabby, unequal feel; and, when there is no stricture, is perfectly indolent. It is more compressible than that arising from protruded intestine; and when the quantity of omentum is large, the epiplocele can in some measure be distinguished by its weight.

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* Scarpa Traité Pratique des Hernies trad. de l'Itálien, p. 53. 8vo. Paris, 1812.

† Chir. Wahrnehmungen, 2 Th. p. 297.

‡ Précis d'Opérat. t. ii. p. 53.

§ Scarpa, Traité Pratique des Hernies, p. 56.

‖ A. Cooper's Anatomy and Surgical treatment of Inguinal and Congenital Hernia, p. 3.; Supplement au Traité de J. L. Petit sur les Mal. Chir. p. 113.

In an enterocele, the tumour is usually more flatulent, tense, and elastic. If the intestine be distended with wind, have any degree of stricture made on it or be inflamed, the swelling will be tense, resist the impression of the fingers, and give pain upon being handled. On the contrary, if there be no stricture, and the gut be neither distended with air nor inflamed, the tension will be trivial, and no pain will occur upon handling the tumour. When the patient coughs, an enterocele feels, as Mr. Pott observes, just as if it were blown †into. When an intestine, containing air, is reduced, it frequently occasions a guggling noise.

In the entero-epiplocele, of course, the symptoms are mixed.

Some herniæ are capable of easy and immediate reduction. This is usually the case, when the aperture through which the parts protrude, is not so small as to produce constriction, and when these same parts have not contracted any adhesions. In old cases of epiplocele, the omentum frequently cannot be reduced, in consequence of the morbid enlargement, which the protruded portion has undergone, even though its neck may not suffer any degree of stricture.

When herniæ can be reduced by the hand, this ought always to be done; and the patient should afterwards constantly retain the parts in their natural situation with a truss.

Many herniæ are incapable of reduction, though not in a state of strangulation, or inflammation. In this sort of case, the incapacity of reduction is mostly owing to the largeness and quantity of the contents of the hernial sac; to a morbid thickening and enlargement of them; and to adhesions, which they have contracted with each other, or with the inside of the sac.

When a bubonocele is rendered incapable of reduction, in consequence of adhesions, or the largeness of its contents, it fills the scrotum, and displaces the integuments of the penis, in such a degree, that the patient is disqualified for copulation. The course of the alimentary matter is always more or less obstructed, in that portion of the intestines which composes the hernia; the patient is subject to complaints of the digestive organs, colic pains, or even a total stoppage of the intestinal contents. This last accident may arise from the matter accumulating too copiously in a part of the bowel that has lost its power of action, so that the collection continues to increase above the obstruction *; or it may be produced by the protrusion of an additional piece of intestine or omentum, which causes the parts, embraced by the opening, through which the hernia descends, to become strangulated. In this last case, therefore, the viscera suffer a painful constriction; and not only is the passage of their contents impeded, but the parts, in the vicinity of the incarceration, are attacked with inflammation. Persons afflicted with herniæ are incessantly exposed to these two dangers, namely, simple obstruction in the protruded bowels, and strangulation of them. The first (called by the French *engouement*) is frequent in old subjects, and in cases where the hernia is ancient and voluminous; the second is most common in young people and adults. †

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* Operations in Surgery, p. 75.

† Chirurgical Works, vol. ii, p. 21. edit. 1808.

Persons with irreducible ruptures, should avoid every rough description of exercise; should support the hernial tumour with a bandage, and carefully keep it out of the way of all harm from pressure, bruises, &c. and should be particularly attentive to avoid all irregularity of diet, and costiveness.

As Mr. Pott observes, it is fit that mankind should be apprised, that the quiet inoffensive state of these cases is by no means to be depended upon: an inflammation of that part of the gut which is down; any obstruction to the passage of the aliment or feces through it; a stricture made on it by the opening, through which it protrudes; are circumstances always likely to put the life of the patient into danger.

A stricture in this case is more dangerous, than in ordinary instances, because there is hardly a possibility of obtaining relief, except by an operation. ‡

An irreducible omental hernia free from constriction and inflammation, is not productive of much immediate danger; but it is always apt to induce perilous symptoms, when affected with inflammation from any accidental cause. Such patients are to be considered very liable to a protrusion of a piece of intestine into the sac.

Some herniæ are reducible, but not without difficulty, the patient being subjected to a good deal of pain and danger.

The difficulty of reduction, the pain, and the danger, may depend on the magnitude of the piece of omentum, or its inflamed state; the quantity of intestine and mesentery; an inflammation of the gut, or its distention with feces or air; or on the smallness of the aperture, through which the hernia protrudes. But, as Mr. Pott remarks, to whatever cause it be owing, if the prolapsed body cannot be immediately replaced, and the patient suffers pain, or is prevented thereby from going to stool, it is called an *incarcerated* or *strangulated* * *hernia.* The perilous symptoms, attendant on this case, will be presently detailed, as well as the best means for relieving the patient, and avoiding, if possible, an operation. All that I need observe in this place is, that the bad symptoms are entirely dependent upon the constriction which the hernial contents suffer, the obstruction to the passage of the aliment and feces through the intestinal canal; the inflamed and even gangrenous state of the parts contained in the hernial sac; and the degree of inflammation affecting the peritoneum and abdominal viscera.

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* This is the *hernie par engouement* of the French.

† Richerand's Nosographie Chirurgicale, tom. iii. p. 565, 366. edit. 2.

‡ See Pott's Chirurgical Works, vol. ii. p. 49, 50.

Other herniæ are both strangulated, and incapable of being reduced, without an operation.

SYMPTOMS OF A STRANGULATED HERNIA.

The first symptoms are, a tumour in the situation of the rupture, attended with pain, not only in the part, but all over the belly; sickness, and inclination to vomit; suppression of stools, and some degree of fever. If these complaints are not appeased by the return of the intestine, they are soon exasperated; the sickness becomes, in the words of Mr. Pott, more troublesome, the vomiting more frequent, the pain more intense, the tension of the belly greater, the fever higher, and a general restlessness ensues, which is very terrible to bear. If, in this state, the operation be improperly delayed, the vomiting is soon exchanged for a convulsive hiccough, and a frequent ejection of bilious matter from the stomach follows. The tension of the abdomen, and the febrile symptoms, having been greatly increased for a few hours, the patient suddenly becomes quite easy, the swelling of the belly subsides, and the pulse, from having been hard, full, and frequent, becomes feeble and generally irregular. The skin, especially that of the extremities, becomes cold and moist. As Mr. Pott relates, the eyes have now a languor and a glassiness not easy to be described; the tumour of the part disappears, and the skin covering it sometimes changes its natural colour for a livid hue. Whether it keeps or loses its colour, it has an emphysematous feel, a crepitus to the touch. This crepitus is the sure indication of gangrenous mischief within. In this state, the gut either goes up spontaneously, or is returned with the smallest degree of pressure; a discharge is made by stool, and the patient fancies himself better. This feeling, however, is of short duration; for, the hiccough, and the cold sweats, continuing and increasing, with the addition of convulsive symptoms, death soon follows.

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* In English, we have no term exactly expressive of what the French call "engouement," a term applied to those cases, in which the intestinal matter in the protruded bowels forms the obstruction.

The stoppage of the fecal evacuations will often occur in as great a degree, and be equally insuperable by purgative medicines, whether only a portion of the diameter of the gut, or a whole circle of it, be strangulated. The constriction of a mere diverticulum has caused an obstinate and fatal * constipation. Hence, as my friend Mr. Lawrence has observed, the obstruction to the passage of the feces does not seem to be so much mechanical, as dependent on the inflammatory affection of the intestines.

CAUSES OF HERNIÆ.

In the healthy state, says Scarpa, the abdomen, considered as a whole, is acted upon by two opposite forces, which reciprocally counterbalance each other: one is the pressure of the viscera against the parietes of the belly; the other is the reaction of these same parietes upon the viscera, which they contain. If, in all individuals, and all the conditions of life, these two forces were in perfect equilibrium, we should not be liable to hernia; and if, when such equilibrium is broken, the sides of the abdomen were to yield equally at every point to the impulse of the viscera, the result would be an increase of bulk in the whole abdomen, but we should never see true herniæ. The cavity of the abdomen is always completely

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* Cases, exemplifying these observations, are recorded by Morgagni, ep. 34. art. 18.; Benevoli, Due Relazioni Chir. art. 19.; Mém. de l'Acad. de Chir. tom. iii. p. 151. 4to.; Med. Obs. and Enquiries, vol. iv. p. 178. and 355.; Phil. Magazine, vol. xxxi. p. 214, &c.; see a Treatise on Ruptures by William Lawrence, p. 37. edit. 3. 8vo. Lond. 1816. Both to the student and practical surgeon, this last work will be found highly instructive and useful, every part of the subject being well explained, and considered with much judgment, and ability. The references inserted are truly valuable, as they at once introduce the reader to an acquaintance with all the best writers upon this important branch of surgery.

filled, the containing and contained parts react upon, and mutually press against each other. It is by this gentle, but uniform and uninterrupted pressure, that all the bowels reciprocally support one another; and without it, the ligaments of the liver, those of the spleen, and, in general, the various membranous bands of the intestines, would be but very inefficient means for fixing these parts in their respective situations. But, there are certain points of the abdominal parietes, which naturally make much less resistance than others, and which react far more weakly against the pressure made by the viscera from within outwards. Such is especially that part, which extends from the pubes to the anterior superior spine of the ilium. This relative weakness of some points of the parietes of the abdomen is evident in certain individuals, as the effect of malformation; and it may be increased by several internal and external causes, equally numerous and diversified. In one of these cases, let the pressure of the viscera be immoderately increased, as happens in a violent effort, a loss of equilibrium between the two forces, mentioned above, is the immediate consequence; that is to say, the reaction of the abdominal parietes (at certain points at least) is no longer equal to the force of the impulse of the viscera. The united force of the abdominal muscles, diaphragm, and levator ani, is then directed and concentrated against the weakest point of the abdomen, to which it propels the nearest viscus, or that which, from its moveableness, is the most subject to displacement. When this viscus is a noose of intestine, the force which pushes it out of the belly must obviously act at the same time upon the corresponding portion of the mesentery; so that the bowel, as it protrudes, draws the mesentery along with it. When the viscera, which are disposed to protrude, meet with little resistance on the part of the parietes of the abdomen, the hernia is soon formed, and the mesentery is elongated with equal quickness. We have an example of this fact in the congenital inguinal hernia, where the bowel falls, in some measure, into a sac previously ready for its reception. On the contrary, in the common inguinal hernia, a totally different arrangement of the parts makes the progress of the disease much slower. In general, the hernia is not produced immediately the equilibrium, between the force of the impulse of the bowels, and the reaction of the parietes of the abdomen, is destroyed. But, we first notice in the groin a slight elevation, which extends from the anterior superior spine of the ilium to the abdominal ring. Some time afterwards, when the intestine has passed out of the ring, the increase of the hernia, and the elongation of the mesentery, make much more rapid, but simultaneous progress.

As Scarpa observes, a variety of practical observations concur in proving, that the proximate cause of hernia must not be imputed to relaxation of the mesentery, but rather to a loss of the equilibrium between the pressure of the viscera, and the resistance of one or several points of the parietes of the abdomen. In infants, where the neck of the tunica vaginalis is not promptly obliterated, and in subjects, who become suddenly emaciated after having been very fat, herniæ originate from the slightest causes. Women, who have borne children, are more liable to the disease, than other females; and individuals of either sex, who carry considerable burdens, play on wind-instruments, or receive violent contusions * of the abdomen, are also particularly exposed to ruptures, even when there is not the least reason for suspecting any relaxation of the mesentery. Herniæ of the vagina, a consequence of difficult labours, are another proof of the same truth, as they are owing to relaxation and weakness of the sides of the vagina, which becomes therefore incapable of resisting the pressure of the viscera at the bottom of the pelvis.

With regard to the fact, that, in the formation of hernia, the combined force of all the abdominal muscles is directed, and as it were concentrated, against the weakest point of the parietes of the belly, the proof of it will be plain enough in merely noticing what happens in patients with hernia. When they cough, sneeze, or make the slightest effort, they immediately feel the tumour enlarge, and they hasten to support it with their hands. At the same period, the mesentery unquestionably becomes lengthened, in proportion as the bowel protrudes in a greater degree. Indeed, says Scarpa, all the viscera have such a tendency to be displaced, and propelled towards the weakest point of the abdominal parietes, that even those which are the most remote from it, and the most firmly fixed by duplicatures of the peritoneum, may in their turn descend into a hernia; a circumstance, which anatomical knowledge alone could never have led us to anticipate.

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* A. Cooper on Inguinal and Congenital Hernia, p. 13. Where a large portion of the abdominal parietes is weakened by a violent contusion, or the repeated distention of pregnancy, and yields, so as to form a preternatural swelling, containing some of the viscera, the case is named by the French surgeons, an "*éventration.*"

"Les éventrations, ou hernies ventrales, susceptible d'engouement, ne le sont pas d' étranglement, tant est large l'ouverture par laquelle les parties s'échappent de l'abdomen." Richerand, Nosographie Chirurg. t. iii. p. 405. edit. 2.

Sandifort[*], and Palletta[†] found the cœcum, with a portion of the ilium and colon, in an umbilical hernia. Mauchart[‡], Camper[§], and Bose[||], have seen the cœcum in an inguinal hernia of the left side; and Lassus[¶] found the left portion of the colon protruded at the right abdominal ring. If it be proved by all these facts, says Scarpa, that those viscera, which are the most intimately connected to the great bag of the peritoneum and the contiguous parts, may form herniæ; and if such displacements cannot happen, without a considerable elongation of the membranous bands, which hold these viscera in their natural situation; how can we hesitate to believe, that a noose of intestine gradually propelled towards the abdominal ring, may draw along with it the corresponding portion of mesentery. In order to explain the elongation of this membrane, it is quite needless to adopt the supposition of a partial relaxation of it.[**]

The doctrine, that eating a good deal of oil, is conducive to ruptures, seems only to deserve a place among the numerous hypotheses, with which the human judgment is incessantly blinded.

TREATMENT OF A STRANGULATED HERNIA, BEFORE HAVING RECOURSE TO AN OPERATION.

There is no truth in the whole body of surgical knowledge, more confirmed by experience, than what is contained in the following passage of Mr. Pott's Treatise on Ruptures: "A hernia, with painful stricture and stoppage of stools, is one of those cases, in which we can seldom stand still even for a short space of time; if we do not get forward, we generally go backward; and whatever does no good, if it be at all depended upon, certainly does harm, by occasioning an irretrievable loss of time." When we reflect upon what parts are wounded by the operator; when we view the operation in an abstract light, and put out of consideration the whole of that constitutional disturbance, which invariably results from the continuance of the strangulation; there seems ample cause to believe, that the generality of fatal events, consequent to the operation, are attributable to the disease itself, and not to the attempt made for its relief. Mr. Hey very justly remarks, that if Mr. Pott's opinion be true, that the operation, when performed in a proper manner, and in due time, does not prove the cause of death oftener, than perhaps once in fifty times, it would undoubtedly preserve the lives of many, to perform it almost as soon as the disease commenced without increasing the danger, by spending much time in the use of means, which cannot be depended upon. *

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[*] Obs. Pathol. 4.
[†] Nova Gubernaculi Testis Descriptio.
[‡] De Herniis Incarc. in Halleri Disp. Chir. t. iii.
[§] Demonstrat. Anat. Pathol. lib. ii. p. 18.
[||] Animadv. de Hern. Inguin. p. 5.
[¶] Médécine Opératoire, t. i. p. 173.
[**] Scarpa, Traité Pratique des Hernies, p. 38—43.

Indeed, the necessity of having speedy recourse to the operation, as soon as the surgeon has unsuccessfully put in practice some of the most efficacious, and least dilatory, plans of treatment, is indicated by daily experience. This is more particularly the case, since we find it recorded by almost every writer upon the subject, that the intestine is often found in a state of mortification a very few hours after its first protrusion from the cavity of the abdomen.

Hence, in selecting a method of treatment, previously to the operation, it is a matter of the highest importance always to be actuated by a determination to lose no time. The loss of a single hour may launch the patient into a state, from which no subsequent skill can extricate him. Every surgeon, therefore, anxious for his own professional character, or the welfare of his patient, will be cautious to employ only such means as at once possess the greatest efficacy, do not tamper with an urgent disease, and create no perilous delay in recurring to a timely operation.

The taxis, or reduction of the hernial contents by the hand, ought to form the primary object of a surgeon called to an incarcerated hernia. To perform this well in bubonoceles is impossible, without an accurate knowledge of the precise situation of the abdominal ring; and of the direction of that canal, of which the ring is merely the external termination;

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* "Cette opération par elle-même n'est pas si effrayante, ni si dangereuse que le vulgaire le croit; et sa fin assez souvent malheureuse, vient ordinairement parce qu'on la fait trop tard, lorsque le malade est dèja en danger de mourir par la seule inflammation, ou par la gangrene des intestins et des parties voisines." Bertrandi, Traité des Opérations de Chirurgie, p. 21.

Although this observation is strictly true, and coincides with the opinions of the most judicious surgeons of the present time, it is not to be supposed, that the operation is itself attended with no risk of inducing dangerous consequences. The contrary is quite proved, by the severe and sometimes fatal symptoms, which have often been brought on by it, when undertaken for cases, in which no strangulation, inflammation, &c. existed, and where the sole object was to get rid of the tumour. See Petit's Traité des Mal. Chir. tom. ii. p. 354—357.; Arnaud's Mém. de Chir. tom. ii. p. 453—456.; Abernethy's Surgical Works, vol. i. p. 6. and particularly, a note p. 11, &c. &c.

and it has often been a matter of surprise to me, that many surgical authors, who have been tediously particular in relating the mode of performing the taxis, should never have reminded their readers of the great utility of attending carefully to the situation of the opening, through which the hernia protrudes. The projecting point of bone, termed the *angle of the pubes*, is the chief guide to the situation of the ring. The opening lies a little above, and on the inside of this bony prominence, which is very distinguishable in the fattest subject.

The contents of an ordinary bubonocele descend through the canal of the abdominal ring downward and inward; or more correctly speaking in the direction of a line drawn from the ilium to the angle of the pubes, as will be presently more clearly explained; the sac, invested by a certain fascia and the cremaster muscle, lying beneath the integuments, in front of the spermatic cord. In attempting reduction with the hand, therefore, all our pressure should be concentrated in the direction upward and outward, so as to press the contents of the hernia in the direction of the axis of the canal of that opening, out of which they protrude. The external oblique muscle should be relaxed. For this purpose, the thorax should be elevated, and turned towards the opposite side. Since, also, the femoral fascia, when tense, tightens Poupart's ligament, and an aponeurosis which is spread over the hernia, the thigh should be bent, and rotated inward.

In the femoral hernia, the viscera descend first downward and then forward, and the pressure should therefore be made first backward and then upward. Indeed, as the tumor mounts over the edge of the falciform process of the fascia lata, it should first be pushed a little downwards.* The external oblique muscle should be relaxed and the thigh bent, as in the case of bubonocele. As Gimbernat and Mr. Hey have noticed, the stricture in the femoral hernia is not made, as was supposed, by Poupart's ligament, but by a band of ligamentous fibres, situated more deeply, to which we shall advert in describing the operation. But, as this band is connected with Poupart's ligament, the relaxation of the latter must necessarily also relax the former part.

No violence should ever be employed in attempting to reduce the contents of a hernia with the hand. Force can never do good, and may do immense injury to the inflamed viscera, contained in the hernial sac. M. J. L. Petit †, and Mr. A. Cooper ‡, even mention examples, in which the intestine was burst, by the employment of too much force in the attempts at reduction.

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* See Hey's Practical Obs. in Surgery, p. 150. edit. 3.

† Supplement au Traité de J. L. Petit sur les Maladies Chir. p. 113.

‡ On Inguinal and Congenital Hernia, p. 3.

Some writers have maintained, that when the rupture becomes painful, we are no longer justified in persevering in attempts at reduction by the hand. Certainly, it must be admitted, that all unnecessary and protracted handling of an inflamed hernial tumour ought to be condemned, as tending to increase the inflammation, and accelerate the approach of gangrene. However, were we always to omit making another trial of the taxis, because inflammation of the parts had come on, I believe, that there would often be a necessity for having recourse to the knife, when the taxis, either alone or assisted by other means, would answer every purpose.

It appears, that Richter has seldom seen a truly incarcerated hernia reduced by the taxis, and when this operation succeeded, circumstances had been so altered for the better by other means, and the parts returned so easily, and unexpectedly, although all previous trials had failed, that this gentleman was inclined to think, that the hernia would have spontaneously gone up, a few hours afterwards.

Desault also believed, that ruptures, in which the inflammatory symptoms are strongly marked, seldom admit of being reduced by the taxis; and he proves, that long-protracted handling of the tumour has a very unfavourable influence on the event of the case. This celebrated surgeon found, that the operation was less successful in a number of patients, on whom repeated trials of the taxis had been made, than in a similar number of persons, operated on, without these attempts.

I am decidedly of opinion, that the general tenor of the foregoing remarks is perfectly correct, viz. that handling an inflamed hernial tumour has a very pernicious effect on the state of the parts, and should not be persevered in too long. But, I entirely dissent from Richter, who represents the taxis, as being quite a useless proceeding in cases of incarcerated hernia; and I cannot altogether agree with some other writers, in advising the knife to be employed, whenever the tumour is inflamed.

I have reduced ruptures with my hand, when they have been in a very painful state, attended with every symptom of strangulation.

When manual attempts at reduction have failed, other auxiliary means should be immediately tried. In the opinion of the most experienced men, bleeding, cathartics, clysters, cold topical applications, the warm bath, and tobacco smoke, or decoction, introduced into the large intestines, are the most efficacious. Yet it is not enough to possess this information; for, to render our knowledge likely to be productive of a judicious practice, it behoves us to learn precisely what degree of reliance should be placed upon each of these means, and the exact order in which they ought to be tried, so as to procure the greatest chance of relief, without occasioning any hazardous delay, beyond that critical moment, at which the operation is most strongly indicated.

When reduction by the hand proves impracticable, I am inclined to think venesection should be immediately practised. The testimony of the best writers is in favour of this plan; and the little time consumed in trying its effect, is another weighty circumstance in its recommendation. It is advisable on the principle of its counteracting inflammation, and of its inducing a temporary weakness and even syncope, with a general relaxation, highly favourable to the success of the taxis.

A strangulated hernia is to be regarded as a disease, accompanied with a considerable tendency to inflammation: the impeded functions of the intestinal canal may, and do certainly, produce an alarming disorder of the constitution; but, I cannot help considering the advanced progress of the inflammation in the contents of the hernia, as having a chief share in producing death, the degree of danger being in some degree proportioned to the state of the protruded viscera. Bleeding is not, however, to be looked upon as capable of preventing the effects of such inflammation altogether, but only of retarding the progress, which, of course, they will still make as long as the cause of the inflammation, the strangulation of the viscera, continues.

In very old and feeble subjects, the use of the lancet may be sometimes judiciously omitted.

The examination of every subject that dies of this disease evinces, that inflammation and gangrene are infallible consequences of the strangulation being continued beyond a certain period. I entertain a firm opinion, that Mr. Wilmer, of Coventry, notwithstanding the bad effects which he imagined to arise from bleeding, has only offered a visionary and unfounded theory, in explanation of the cause of death in these cases. Had he been entirely divested of prejudice, it would be difficult to conceive, how he could have overlooked the strong and manifest traces of inflammation, apparent in every subject after death. Mr. Wilmer's idea, that bleeding renders the subsequent operation more dangerous, is most ably refuted by Mr. Hey. *

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* In the hernia attended with mere obstruction (engouement), and not strangulation, bleeding is unnecessary.

Mr. Alanson thought, that bleeding never promoted the success of the taxis. However, this opinion is contrary to the sentiments of the best writers, and most experienced practitioners. The authority of Le Dran, Pott, Richter, Callisen, Sabatier, Flajani, and of numerous other celebrated surgeons, might be adduced.

In performing the operation, a large opening should be made in the vein, in order that the sudden evacuation of the blood may make the patient faint; for, the taxis is observed to be particularly successful during a swoon. For the same reason, a liberal quantity of blood should be taken away.

Having bled the patient, it becomes advisable to make another attempt to reduce the parts by the hand; and if fainting should occur, this favourable opportunity ought not to be lost.

Too often, however, the hernial contents are not be released from their incarcerated state by such mild treatment.

I calculate, that half an hour would be amply sufficient for putting in practice what has been above recommended, viz. the attempts at reduction by the hand, and bleeding.

Success not being obtained, I would next recommend the patient to be placed in a warm bath, if one could be speedily provided. But, though I have reduced several herniæ, while patients have been in this situation, and though I place considerable reliance in its efficacy, so perilous does delay appear to me in these circumstances, that should any great length of time be unavoidably necessary to prepare the bath, I think it would be most judicious not to remain inactive. The effect of a semicupium being also uncertain, I would recommend it either to be dispensed with entirely, or to be prepared during the trial of other means. I sincerely hope, that my words convey my meaning; and I repeat my great reliance in the frequent efficacy of the warm bath, on which account it appears to me worthy of a trial, immediately the taxis and phlebotomy have proved ineffectual. I would only recommend it to be dispensed with, when its employment would unavoidably occasion much delay.

In case a warm bath cannot speedily be prepared, let not the surgeon tamper with a disease so urgent in its nature, so rapid in its progress, and so often fatal from the inert and timorous conduct of the practitioner. Let him not, at all events, consume any material time in trying the effect of clysters and cathartics. The utility of the latter, in cases of enterocele, may be very rationally questioned. Every one, however, will admit, that in cases of inflamed epiplocele they must be beneficial, and ought to be administered.

In every instance, in which there is reason to believe the strangulated hernia to be of the intestinal kind, no sooner have the repeated attempts at reduction with the hand, assisted by bleeding, and the warm bath, failed, than the surgeon should immediately try the united effect of cold, applied to the tumour, and of a tobacco clyster, or its fumes, introduced into the large intestines. Snow or ice pounded, and mixed with salt, and put into bladders, should be applied to the swelling. In case these substances could not be obtained, the evaporation of æther, or spirits, from the surface of the swelling, might be tried as a substitute.

Some practitioners prefer tobacco fumes; others the decoction, injected into the rectum. The latter seems to me the most eligible, because the smoke apparatus is frequently out of order, or cannot be immediately obtained. In preparing the tobacco clyster, it is very wrong and unnecessary to lose half an hour in infusing the plant, as is sometimes directed.

℞ Nicotianæ ʒj.
Aq. ferventis ℔j.

The plant may be macerated ten minutes, and the liquor then strained for use. One half should be first injected, and soon afterwards the other, unless the effects of the former quantity appear too violent and overcoming.

Frequently, during the combined action of the ice and tobacco, the contents of the hernia return spontaneously into the abdomen; but, when this is not the case, the surgeon should make another final effort to reduce the parts by the hand. If this again fails, even when the patient is duly under the influence of the tobacco, and if the symptoms of strangulation, at the same time, continue to increase, the operation ought undoubtedly to be undertaken, without further delay.

OF HERNIÆ WITH OBSTRUCTION, (ENGOUEMENT,) BUT NOT STRANGULATION.

What the French surgeons call "*engouement*," is produced by the accumulation of the intestinal matter in the protruded portion of the bowels. It is most common in old large herniæ, and depends upon the difficulty, with which the contents of the intestines ascend against their gravity, so as to pass from the bowels, contained in the hernia, into the rest of the intestinal canal. When substances like plum or cherry stones, have been swallowed, they pass with slowness and difficulty into that portion of the bowels, which forms the hernia, and which being weakened, and not having its peristaltic action assisted by the alternate action and reaction of the diaphragm and abdominal muscles, is incapable of propelling onward the substances which have entered it. These lodge in the part; the canal becomes obstructed; the intestinal contents continue to accumulate, in larger and larger quantities, between the stomach and the seat of the obstruction; and the hernial tumour enlarges, being at first almost indolent, soft, and doughy, and not elastic and painful, as in a true case of strangulation. The *engouement*, or simple obstruction of a hernia, is essentially different from incarceration, or strangulation, inasmuch as it may exist, without there being any disproportion between the opening, through which the hernia takes place, and the protruded parts. It is entirely produced by the lodgment of the intestinal contents in a portion of the bowels, that is incapable of emptying itself, either by its own action, or any auxiliary means. In the mean while, the abdomen becomes tense; the tumour grows larger and painful; the patient, who had only been troubled with nausea, now vomits up the contents of the bowels; fever commences; and all the symptoms of strangulation occur in combination with such as originate from the mere obstruction. This latter state, unattended with actual strangulation, may exist several days, and even weeks, without putting a period to life; while on the contrary, the bowels, when strangulated, immediately inflame, and sometimes become gangrenous in the course of four-and-twenty hours.

According to the French surgeons, bleeding is seldom of any use in hernia, accompanied simply with obstruction (engouement). They disapprove of the employment of emollient applications; and express a preference to tonic spirituous applications, cold water, powdered ice, and purgative clysters. All these means tend to revive the contractile power of the distended bowel, and the clysters, by emptying the large intestines, also favour the further progress of the contents of the protruded viscera towards the rectum. Clysters, containing the sulphate of soda, or magnesia, are here preferable to those made with tobacco.

In this kind of case, the attempts at reduction may be repeated several times a day. The disease is very different from a hernia with strangulation; and examples have occurred, in which the obstruction has been got rid of, as late as eight, ten, or eleven days after its commencement. However, if the patient were aged and infirm, Richerand observes, that we ought not to let the afflicted fall a victim to abstinence and suffering, protracted thus long; for as all nourishment is incessantly vomited up, the weakness induced would render an operation unavailing.

The instant the symptoms of inflammation begin to show themselves with those of mere obstruction (engouement), and the swelling becomes tense, elastic, and painful, the operation is positively indicated, and delay is fatal. *

BUBONOCELE, OR INGUINAL HERNIA.

Of all the various species of hernia, the inguinal is by far the most common. † The existence of the disease, in the unincarcerated and reducible state, is indicated by the following circumstances:

1. By a tumour arising from a protrusion of some part of the bowel through that canal or opening which is commonly called the abdominal ring, and which in the male subject gives passage to the spermatic cord; and in the female, to the round ligament of the uterus. The swelling is not preceded by any symptoms of inflammation; and, though according to the opinion of the most accurate observers, its commencement is generally slow and gradual ‡, it afterwards frequently undergoes a sudden enlargement, and is for the first time particularly noticed by the patient himself, after he has been making some violent effort.

2. By the diminution, or even total disappearance of the swelling, when the patient lies upon his back; by its recurrence, when he stands up again; and by the impulse, which is felt in the swelling, whenever the patient coughs.

A few years ago, surgeons had but very imperfect ideas respecting the anatomy of inguinal herniæ; indeed, the anatomical descriptions of hernia, published by Pott and Richter, great as their merit might formerly be, are now in a great measure superseded by the more accurate works of Mr. Astley Cooper §, Scarpa ||, Mr. Lawrence ¶, and Hesselbach. **

About an inch and a half from the pubes, the strongest and thickest part of the tendon of the external oblique muscle splits into two fasciculi; one superior; the other inferior. The upper fasciculus, which is broader than the lower, is inserted into the edge of the angle of the pubes, where it seems to in-

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* Richerand, Nosographie Chirurgicale, tom. iii. p. 375—378. edit. 2.

† "Les hernies inguinales sont incomparablement plus nombreuses, que toutes les autres ensemble, leur proportion est au moins 8=10." Richerand, Nosog. Chir. tom. iii. p. 355. edit. 2.

‡ Scarpa, Traité Pratique des Hernies, p. 40.

§ Anatomy and Surgical Treatment of Inguinal and Congenital Hernia. Fol. 1804.

|| Sull' Ernie Memorie Anatomico-Chirurgiche. Fol. Milano, 1809.

¶ Treatise on Ruptures, edit. 3. 8vo. Lond. 1816.

** Neueste Anatomisch-Pathologische Untersuchungen über den Ursprung und das Fortschreiten der Leisten-und Schenkelbrüche. 4to. Wursburg, 1814.

termix with the fibres of the corresponding part of the opposite side, and with the ligamentous substance, uniting the ossa pubis. The inferior, which is narrower, but stronger and more elastic, passes obliquely, from above downwards, and from behind forwards, above the foramen ovale, forms the femoral arch, and is inserted by means of a strong tendon, into the spine of the pubes, where it becomes blended with the ligamentous substance, that covers the symphysis of that bone.

By the separation of these fasciculi of the aponeurosis of the external oblique muscle, the abdominal ring is produced, an opening, the axis of which passes obliquely from the flank towards the pubes, and the shape of which is rather triangular than elliptical. This aperture is somewhat strengthened by some tendinous fibres, which originate for the most part from the femoral arch, and spread themselves over the opening. *

The aponeurosis of the external oblique muscle is covered, for a certain extent above the femoral arch, and the abdominal ring, by a very delicate expansion of the aponeurosis of the tensor fasciæ latæ. A portion of this thin aponeurotic layer extends beyond the ring, over the cremaster muscle, which it accompanies even into the scrotum, and is there lost in the cellular substance which connects the external surface of this muscle to what anatomists have called the dartos. The other portion extends towards the flank. This tendinous expansion, derived from the tensor fasciæ latæ, is intimately adherent to the edge of the femoral arch, and to the circumference of the abdominal ring, whereby it must tend to resist protrusions through either of these openings. † The internal oblique muscle is closely attached to the inner edge of the crista of the ilium, the anterior superior spine of the same bone, and to the origin of Poupart's ligament. Its inferior fibres, instead of pursuing an oblique direction, from above downwards, become transverse, and extend in fleshy fasciculi past the superior angle of the abdominal ring. Its aponeurosis, says Scarpa, goes in front of the rectus muscle, and terminates in the linea alba. Its inferior attachment is to the spine of the pubes, immediately behind that of the two tendinous pillars of the abdominal ring. The lower muscular fibres, about eight lines from the external side of the summit of the ring, open to form a passage for the spermatic cord, and thus split into two fleshy portions; one external; the other internal. The external is attached, for a certain ex-

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* Scarpa, p. 19—21.

† Id. p. 22.

tent, to Poupart's ligament, and constitutes the principal origin of the cremaster muscle; for, as Scarpa remarks, in some subjects, this muscle has a second, though less remarkable, origin from some fleshy fibres arising from the pubes, close to the insertion of the upper pillar of the ring. The principal origin of the muscle, thus formed from the lowest fibres of the internal oblique, immediately after its attachment to Poupart's ligament, goes to the outside of the spermatic cord; while the fleshy fibres of the second origin, when they exist, are spread over the inner side and front of the cord. They both cover the spermatic vessels, and accompany them into the scrotum, becoming intermixed and crossing each other in various directions, as soon as they have passed out of the ring, and terminating in a species of tendino-membranous sheath, which includes the spermatic cord, with its cellular covering, and the tunica vaginalis testis.*

The transverse muscle, situated under the preceding, is attached to the inner edge of the crista, and to the anterior superior spine of the os ilium. Its fleshy fibres neither extend so low, nor so near Poupart's ligament as those of the internal oblique; nor do its lowest fibres undergo any change of direction, since they form no outlet for any thing. Indeed, the spermatic cord, in passing through the anterior parietes of the abdomen, does not run equally through all the muscles in this situation. As has been already stated from Scarpa, it passes through the inferior fibres of the internal oblique, which separate to afford a passage for it; but it only glides under the lower fleshy edge of the transverse muscle. *The exact point, where it clears the latter muscle, is about an inch nearer the flank than where it pierces the internal oblique*, and where, as Scarpa has related, the chief origin of the cremaster is situated. The aponeurosis of the transverse muscle passes in front of the rectus, to be inserted into the linea alba; and below the abdominal ring it is implanted into the pubes, behind the attachment of the aponeurosis of the external oblique.†

Besides the circumstances already stated, with respect to the abdominal ring, it is necessary to understand, that, on the side towards the peritoneum, it is shut up by the aponeurosis of the internal oblique and transverse muscles; which aponeurosis, though much weaker than that of the external oblique, hinder any direct protrusion of the bowels into the ring. The passage of the spermatic cord, through the three layers of abdominal muscles, is not directly from behind forwards, in the direction from the sacrum to the pubes, but *it takes place very obliquely*, and in a line drawn from the flank to the pubes. It is obvious, then, that *what is commonly named the abdominal ring, is rather a canal, the internal or deepest extremity of which corresponds to the point where the spermatic cord passes under the margin of the transverse muscle, while its external, or superficial termination is the abdominal ring, strictly so called.* We find also that the spermatic cord crosses the abdominal muscles, one after the other, and in three different places, which do not lie directly from behind forwards. The fact is, *the point where the cord runs under the inferior margin of the transverse muscle is the furthest from the pubes, or about three inches from it. That, where the cord passes through the lower fleshy fibres of the internal oblique, or between these fibres and the principal origin of the cremaster, is an inch from the preceding point. Lastly, the place where the cord passes out of the abdominal ring is only an inch from the pubes, and almost immediately under the integuments of the groin.* Thus, we see, that *the abdominal ring*, taken in the sense of the whole of the opening for the transmission of the spermatic cord, from the flank to the pubes, *is a true canal, about three inches in length, formed in front by the aponeurosis of the external oblique muscle, and behind by the separation of the lower fleshy fibres of the internal oblique, by the lower edge of the transverse muscle, and by the aponeurosis of these two latter muscles,* which descending lower than the abdominal ring, and being inserted into the pubes, hinder all direct communication between the ring and cavity of the abdomen.

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* Scarpa, Traité Pratique des Hernies, p. 23, 24.
† Ib. p. 25.

The oblique, but naturally open passage for the spermatic cord, from the flank towards the pubes, and the manner in which the aponeurosis of the internal oblique and transverse muscles strengthen the inside of the ring, are circumstances which fully account for the fact, that, in the inguinal hernia, the viscera almost always protrude in an oblique direction from the flank to the pubes, a protrusion of them straight forwards being rather uncommon. *

The peritoneum, as Scarpa remarks, is not every where equally strong and elastic, nor are all points of it equally supported by the abdominal muscles and their aponeurosis. In the lumbar region, it is firmer and more elastic than at the sides and front of the abdomen. In the vicinity of the navel, and ensiform cartilage, and particularly along the linea alba, it is very thin. But, in these places, that is to say, from the ensiform cartilage far down, for some finger-breadths below the navel, it is covered by a double aponeurosis, derived from the transverse and internal oblique muscles; an aponeurosis, which, on each side, forms the sheath of the rectus muscle. At the bottom of the hypogastric region, and for some way from the pubes, the peritoneum is in immediate contact with the latter muscle, which here has no sheath. Lastly, in the situation of Poupart's ligament, and in the track which the spermatic cord follows before it issues from the ring, the peritoneum is protected by no very firm part, except the aponeurosis of the external oblique muscle; for little stress can be laid upon those of the internal oblique and transverse muscles, which are here very weak and delicate. Here, indeed, the tendon of the external oblique is stronger than at any other point, especially along the crural arch; the lower pillar of the abdominal ring is also stronger and more tendinous than the upper; while the femoral arch is closely connected to the aponeurotic expansion derived from the fascia lata; all which arrangements tend to strengthen this part of the abdominal parietes. Yet they but imperfectly make up for the weakness of the aponeurosis of the internal oblique and transverse muscles; and, it is obvious, that throughout the track of the spermatic cord, from the lower margin of the latter muscle to the external orifice of the ring, the peritoneum is less supported by fleshy and tendinous layers, than at any other point of the belly. *

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* Scarpa, Traité Pratique des Hernies, p. 26—28.

The peritoneum is united to the muscles and aponeurosis of the abdomen by means of a very supple extensible cellular substance, which, without any laceration, allows the former membrane to become displaced.

The loose cellular substance, which envelopes the spermatic vessels behind the peritoneum, passes, along with them, under the fleshy margin of the transverse muscle, and through the separation of the lower fibres of the internal oblique; in short, it accompanies these vessels through the whole extent of the inguinal canal, and into the scrotum, as far as the point, where they enter the testicle. This cellular covering is a continuation of the similar texture, which is found every where upon the external surface of the peritoneum. As it approaches the ring, it becomes more and more voluminous; and, as soon as it is on the outside of this aperture, it becomes en-

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* Scarpa, p. 31, 32.

closed with the spermatic vessels and tunica vaginalis of the testicle, in the muscular and aponeurotic sheath of the cremaster, which extends to the bottom of the scrotum. *

The epigastric artery runs near the external side of the abdominal ring. It arises from the external iliac artery, a little way from the crural arch, and about an inch below the convexity of the great bag of the peritoneum. The space between this convexity of the peritoneum and the origin of the artery, is filled up by a good deal of cellular membrane, which is continued over the spermatic cord and the femoral vessels. The epigastric artery, originating sometimes from the inside, and sometimes from the front part of the external iliac, by forming with the latter vessel a more or less acute angle, conceals itself almost immediately under Poupart's ligament, and the aponeurosis of the internal oblique and transverse muscles. Thence, running over the convexity of the peritoneum, it ascends obliquely towards the rectus muscle of its own side. In its course near Poupart's ligament, it is crossed by the spermatic cord. †

The exact point where an inguinal hernia usually begins, is that which corresponds, in the fœtus, to the communication of the tunica vaginalis with the peritoneum, and, in the adult, to the passage of the spermatic cord under the transverse muscle. According to Mr. A. Cooper, it is about an inch and a half from the external orifice of the abdominal ring; and, as Scarpa explains it, about three inches from the pubes.‡ In the healthy state, says Scarpa, the peritoneum presents in this situation a small depression, the depth of which increases in proportion as the spermatic cord is drawn further downwards. *It is this little bag, this kind of digital appendix, which, by its progressive developement, constitutes the hernial sac.* Lying upon the front of the spermatic cord, it first makes its appearance under the lower margin of the transverse muscle; thence it extends itself into the separation between the lower fleshy fibres of the internal oblique, invariably following the spermatic cord, on the front of which it is situated, and, after having thus traversed all the canal, which proceeds from the flank to the pubes, it finally protrudes at the external opening of this canal, or at the abdominal ring, properly so called. In all this course, the hernial sac, as well as the spermatic cord, is situated above the crural arch, the direction of which it follows; and the canal, which it passes through, is of a conical shape, the apex of which is towards the flank, and the base at the external orifice of the ring. *

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* Scarpa, p. 34.

† Id. p. 36.

‡ Scarpa describes the canal of the ring as about three inches in length; a statement which can be reconciled to Mr. A. Cooper's account, by noticing that the former extends his measurement quite to the spine of the pubes.

If we examine a man who has an incipient inguinal hernia, says Scarpa, we shall discover in the fold of the groin, and parallel to the femoral arch, a slight oblong protuberance, which is increased in size by any effort, such as coughing, or sneezing. When it is compressed, it gradually disappears, and we find its contents recede in an oblique line, drawn from the pubes to the flank. This is particularly obvious in recent congenital herniæ, complicated with adhesion of the viscera to the testicle. During the reduction, we then plainly perceive the bowels and the testicle passing obliquely outward and upward, towards the orifice where they first protruded, and not entering the belly again straight backwards. †

In old herniæ, however, things are somewhat different; and, as Mr. A. Cooper ‡ first explained in his valuable work on this subject, the internal opening of the passage, through which the parts protrude, becomes situated more directly backwards with respect to the abdominal ring.

Scarpa says, when the inguinal hernia is first hardly distinguishable in the groin, an evident change is already observable in the direction of those tendinous bands which lie a little above the ring, and cross the direction of the fibres of the aponeurosis of the external oblique muscle. In proportion as the tumour increases, this alteration advances, and becomes more and more marked. When the tumour is large enough to reach into the scrotum, the upper pillar of the ring is pushed so far upwards and forwards, that all those little tendinous bands are brought together, and accumulate, as it were, at the upper margin of the ring, which here acquires, from this particular circumstance, a very considerable thickness and strength. Should the hernia still make further progress, the ring becomes larger and larger; which change cannot happen without occasioning a gradual diminution of the length and obliquity of the canal through which the spermatic cord passes. Thus, when a scrotal hernia has attained a considerable magnitude, the ring and neck of the hernial sac no longer form a canal running obliquely from the flank to the pubes, but a large opening, which communicates almost directly, from before backwards, with the cavity of the abdomen. §

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* Scarpa, p. 44, 45. † Id. p. 46.

‡ On Inguinal and Congenital Hernia, fol. Lond. 1804.

§ Scarpa, p. 52.

Immediately the hernial sac begins to form under the margin of the transverse muscle, it becomes connected to the front surface of the spermatic cord: indeed, one might say, that this adhesion exists before the formation of the hernial sac commences, since it is produced by the layer of cellular substance, which at all times covers the external surface of the peritoneum, and keeps it in contact with the spermatic cord, as well as other points of the parietes of the belly. As this cellular substance is very elastic, it yields in proportion as the hernia is developed; so that the hernial sac always adheres closely to the spermatic cord through its whole track, from the internal orifice of the inguinal canal to the bottom of the scrotum. At the place where the spermatic cord and hernial sac, joined together, pass through the separation in the lower fibres of the internal oblique muscle, the cremaster muscle is seen going to their external side, and accompanying them beyond the ring, where, as we have seen, it is converted into a muscular and aponeurotic sheath, which, embracing the hernial sac, the spermatic cord, and the tunica vaginalis, proceeds with these parts to the bottom of the scrotum. The hernia never descends beyond the point where the spermatic vessels enter the testis, because there the cellular substance of the cord terminates.*

In old large scrotal herniæ, the cremaster muscle acquires a thickness truly surprising; its fibres, which are naturally very thin, become from four to six times more bulky. Where they are spread over the neck and body of the hernial sac, they sometimes present a remarkable firmness, and a yellowish colour. In old scrotal ruptures, it is not uncommon to find the fibres of this muscle intimately adherent to the edges of the abdominal ring; a circumstance, says Scarpa, which may depend upon the pressure which the contents of the hernia make on these edges, or, perhaps, also upon the union of the cremaster muscle with the portion of the fascia lata, which proceeds from the margin of the ring to the groin and scrotum. However this may be, as Scarpa has explained, it is certain that, in old scrotal herniæ of large size, a probe cannot be passed between the fleshy fibres of the cremaster and the edge of the ring, without a good deal of difficulty; while, in recent herniæ, a probe will pass as easily between the edges of the ring and the cremaster as between this muscle and the hernial sac. As I have already related, the apparent thickening of the hernial sac is not most commonly owing to such a change in the protruded peritoneum itself, but to a thickening in the tendinous expansion derived from the fascia lata, together with a similar alteration of the cremaster, and of the cellular substance immediately on the outside of the sac. Thus, according to Scarpa, in an inguinal hernia, we have, directly under the common integuments, an aponeurosis derived from the fascia lata; under this the cremaster; below this muscle the cellular substance on the outside of the sac; and, then, the sac itself. This author makes no mention of the fascia, which Mr. A. Cooper describes as being sent off from the external oblique muscle. No doubt, therefore, the aponeurosis, stated by Scarpa to proceed from the fascia, and over the cremaster and hernial sac, is the same thing as what Mr. A. Cooper describes as being sent off from the tendon of the external oblique muscle. The displacement of the epigastric artery in the greater number of inguinal herniæ is another subject of importance. This vessel, which naturally runs about ten lines from the abdominal ring, has its situation and direction so altered in subjects with hernia, that it runs across the back of the neck of the hernial sac*, and is pushed from the outside to the inner side of the abdominal ring. In order to comprehend the cause of this displacement, we must recollect what has been already said about the formation of inguinal hernia, and the manner in which the spermatic cord crosses the epigastric artery. The hernia begins at the very point where the spermatic cord emerges from under the lower margin of the transverse muscle, and this place is rather nearer the ilium, than the point where the epigastric artery begins its course towards the rectus muscle. In its progressive increase, the hernial sac constantly follows the same track as the spermatic cord, on the front of which it lies. The cord crosses the epigastric artery: the hernial sac then, before leaving the canal of the ring, must necessarily pass with the cord over that vessel. At the same time, the internal orifice of the hernia enlarging, and the canal of the ring becoming shorter, by the approximation of its two openings, it follows, that, at the period when the hernia begins to appear in the groin, the epigastric artery is of course situated behind the neck of the hernial sac, being displaced from the outer to the inner side of the ring. In a vast number of dissections, Scarpa says he has seen but few instances of inguinal hernia, in which the epigrastic artery was not thus displaced; and, in these exceptions, the weakness of the parietes of the abdomen, between the ilium and pubes, was very remarkable, and, in all the cases, the viscera had protruded through the aponeuroses of the transverse and internal oblique muscle; not towards the ilium, as usually happens, but a little way from the pubes, giving to the upper pillar of the ring an extraordinary curvature, disproportioned to the small size of the hernia. In short, in these individuals, the little digital process of peritoneum, constituting the origin of the hernial sac, had not begun to form under the margin of the transverse muscle, at the place where the spermatic cord goes under it, but it had pierced the aponeuroses of the internal oblique and transverse muscles, a little way from the pubes, within the point where the spermatic cord crosses the epigrastic artery. This sort of hernia, says Scarpa, is, strictly speaking, a compound of the ventral and inguinal: resembling the first, inasmuch as the hernial sac passes through the aponeuroses of the transverse and internal oblique muscles; and the last, in passing, with the spermatic cord, through the abdominal ring. *

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* Scarpa, p. 46, 47.

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* Scarpa, tab. ii. fig. 4, 5, 6., and tab. iii. p. 4. 6. 8. Camper, Icones Hern. tab. x. P. H. tab. xii. M.

Hesselbach distinguishes this case by the name of the *internal* inguinal hernia, while the more common form of the disease he calls *external* †; a division, says Scarpa, which would be very important, if the characters, which the author assigns to the two cases, were sufficiently obvious in the different degrees of the disease. It is certain, however, that the internal inguinal hernia, while small, is attended with a particular rotundity; that it pushes up in a remarkable manner the upper pillar of the ring; that it forms a much more considerable elevation about this opening than an external inguinal hernia of the same size; that it does not occasion any cylindrical elevation in the fold of the groin; that, when it is reduced, no guggling noise is heard; and that the spermatic cord always lies on its outside. But, when the hernia is large, these signs, as Scarpa observes, no longer serve for discrimination. ‡ In consequence of the place where the viscera first protrude being situated as above described, Mr. A. Cooper recommends the pads of trusses to be so constructed as to make pressure upon it.

Though, in the external inguinal hernia, the hernial sac commonly lies upon the spermatic cord, it should be remembered, that instances are recorded, in which the vas deferens and spermatic vessels have been situated in front of the * sac, as well as other examples, in which the hernia was interposed in various ways between the parts composing the † cord. These changes are chiefly observed in herniæ of large size. The vessels of the cord, however, are generally but little separated from each other towards the ring, diverging more and more as they proceed downward. ‡ A similar alteration in the position of the vessels of the cord is noticed in large hydroceles. §

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* Scarpa, p. 68. 71.

† Anatomisch-Chirurg. Abhandlung über den Ursprung der Leistenbrüch. Wurzburg, 1806.

‡ P. 72.

MARKS OF DISCRIMINATION BETWIXT INGUINAL AND CRURAL HERNIÆ.

I have known very good surgeons sometimes differ in opinion, as to whether certain cases were inguinal or crural herniæ; and occasionally the error on one side was not dispelled, till a confused operation, or the death of the patient, had thrown light upon the disease. Practitioners may the more easily fall into mistakes of this kind, in consequence of inguinal herniæ being always expected in men, and never in women; while crural ruptures are regarded as a common affliction of females, but a most unfrequent one of males. Deviations, however, from what is ordinary are possible, and should ever be in the recollection of a consummate surgeon. In men, a crural hernia may acquire a very large size, ascend above Poupart's ligament, and project over the abdominal ring. The swelling has then a roundish form, and may resemble an inguinal hernia, that contains only intestine, that is gradual in its increase, and that has not yet descended into the scrotum.

I shall not insist on the likelihood of the mistake being discovered, by the impossibility of reducing such a hernia by pressure, directed from below upwards and outwards, in the oblique course of the canal within the abdominal ring. As will be hereafter related, the femoral hernia only admits of reduction, by being pushed first from above downwards, and then perpendicularly with respect to the groin. The relation,

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* Le Dran, Traité des Operations, p. 127.; Schmucker, Vermischte Schriften, vol. ii. p. 55.; A. Cooper on Inguinal and Congenital Hernia, p. 49.

† Hey's Practical Observations in Surgery, p. 140. edit. 2.; A. Cooper, op. cit. p. 9. and 10.; Camperi Icones Hern. tab. 8. et 13.

‡ Scarpa, Traité Pratique des Hernies, p. 62.

§ Id. p. 64.

which the neck of the tumour bears to the crural arch, will enable the practitioner to distinguish the nature of the cases. When a crural hernia is drawn downwards, the crural arch can be traced extending over the neck of the sac; while, in a bubonocele, it runs under that part. The spine of the pubes, which is behind and below the neck of the sac in an inguinal hernia, is on the same horizontal level, and rather within it, in the crural rupture. *

In women, a bubonocele may be mistaken for crural hernia. A protrusion of the bowels at the abdominal ring, being exceedingly uncommon in females, the surgeon is less apt to be on his guard against an error. The swelling may descend from the ring over the crural arch, so as to resemble in some measure a femoral hernia, that has mounted over Poupart's ligament.

Besides the mode of discrimination already adverted to, it deserves attention, that a bubonocele in women always descends from the abdominal ring, in the direction of the round ligament of the uterus, and tends to the substance of the labium; just as the inguinal hernia in man follows the course of the spermatic vessels, and falls towards the scrotum. On the contrary, the crural hernia may remain below, or rise over the crural arch; but, its direction is never towards either the labium or the scrotum. †

CASES MOST LIABLE TO BE MISTAKEN FOR BUBONOCELE.

These are the cirsocele, hydrocele, hernia humoralis, enlarged inguinal glands, the lodgment of the testicle at the ring, hæmatocele, and encysted hydrocele of the spermatic cord.

The cirsocele, or varicose enlargement of the spermatic veins, resembles in several respects a hernial tumour: when large, it dilates upon coughing; it is prominent in the erect posture; and it subsides when the patient lies down. There is only one sure method of distinguishing the two complaints: this consists in putting the patient in the horizontal position, and emptying the swelling by pressure upon the scrotum. The surgeon is then firmly to press upon the upper part of the abdominal ring, when, if the case be a hernia, the tumour cannot re-appear as long as the ring is compressed; but, if the disease be a cirsocele, the swelling returns with increased size,

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* Lawrence, p. 395. edit. 3.

† Pelletan, Clinique Chirurgicale, tom. iii. p. 28.

on account of the pressure interrupting the course of the blood through the spermatic veins. *

The hydrocele may be distinguished by the perfect equality of the whole tumour; its transparency when a candle is placed behind it; the smallness of the spermatic process; the absence of pain on handling the swelling; the fluctuation of the water; the gradual formation of the tumour; its having begun below, and proceeded upward; its not being affected by any posture or action of the patient, nor increased by his coughing; and lastly, the absolute impossibility of feeling the testicle at the bottom of the scrotum.

The hernia humoralis may be known by the hardened state of the epidydimis; the exemption of the spermatic cord from all unnatural fulness; the generally preceding gonorrhœa; the pain in the testicle and loins; the weight of the tumour; and the tense, reddish, smooth, shining, uncorrugated appearance of the scrotum.

An indurated gland may be distinguished from a hernia, by its being unconnected with the spermatic cord, and by its circumscribed, incompressible hardness; and when in a suppurated state, the fluctuation of matter can be felt.

The lodgment of the testicle at the abdominal ring may be mistaken for an incipient hernia; but, the absence of that organ in the scrotum, and the great sensibility of the tumour, are circumstances, by which an attentive practitioner may always avoid miſtake.

Hæmatocele, or a collection of blood in the tunica vaginalis, is particularly apt to be confounded with a hernia, in consequence of its generally proceeding from a blow, and having the same shape as the last disease. But, says Mr. A. Cooper, the firmness of the hæmatocele; the redness of the skin accompanying it; its not dilating when the patient coughs; and the spermatic cord being free from swelling at the ring, will point out the difference of the complaint.

Cysts, filled with water, sometimes form in the course of the spermatic cord. When quite below the ring, they may be readily discriminated by their not being connected with the abdomen. When they reach within the ring, and have no distinct transparency, nor fluctuation, they should be opened with great circumspection. I have known an encysted hydrocele of the cord accompany the existence of an old hernial sac, be mistaken for a protrusion of the viscera, and on account of

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* See A. Cooper's Anatomy, and Surgical Treatment of Inguinal and Congenital Hernia.

complaints, induced by a kick in the groin, operated upon, under the idea of the case being a strangulated hernia. When the cyst, the supposed hernial sac, was opened, the fluid which it contained, was discharged, and on introducing the finger, nothing was found but a circumscribed cavity. After a few more incisions, an opening was made into the real hernial sac, which was not suspected of being so, as no viscera protruded. Upon passing the finger upward, some fluid now escaped from the abdomen, and all seemed uncertainty, as to what the case actually was; nor did the doubts subside, till the parts were examined after death, the following day.

OPERATION FOR THE BUBONOCELE.

The hair should first be removed from the tumour and adjacent parts.

The incision is to commence about an inch above the ring; and unless the tumour be large, it is best to extend the wound nearly to the lowest part of the swelling. In operating upon a scrotal hernia of middling size, it is of no importance, whether the incision tend a little more towards one side of the swelling, than the other. But, if the hernia be old, and of large size, the cut should be made exactly in a longitudinal line, that divides the tumour into two equal parts; for in this degree of the disease, we know, that the component vessels of the spermatic cord are frequently separated from one another, and pushed over the sides, or even upon the very front of the lowermost portion of the hernial sac. Therefore, by dividing the lateral and inferior part of the sac in such cases, the surgeon would run the risk of cutting the spermatic artery, either alone or together with the vas deferens.* In one case lately recorded, the operator, just as he was about to use the knife, perceived the exposed situation of the cord.† The incision through the skin and cellular substance covering the sac, divides the external pudic branch of the femoral artery, which crosses the hernial sac near the abdominal ring, and sometimes bleeds so freely, as to require a ligature. It also exposes the fascia‡, which, according to Mr. A. Cooper, passes off from the external oblique muscle, and covers the cremaster. By beginning the cut above the ring, we gain room where it is much needed, in a subsequent part of the operation, viz. the incision of the stricture.*

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* Scarpa, Traité Pratique des Hernies, p. 100.

† Fardeau, in Journ. Gen. de Méd. Par Sedillot, t. xv. p. 401.

‡ This tendinous expansion, as the reader already knows, is described by Professor Scarpa as being a continuation of the fascia lata.

With a pair of dissecting forceps, a portion of the fascia must next be raised, and a small opening made in it, sufficient for the introduction of a director, on which instrument the surgeon is to divide the fascia upward to within an inch of the abdominal ring, and downward to the end of the first wound.

This division of the fascia exposes the cremaster muscle, which is to be opened precisely in the same manner; when the cellular substance immediately covering the peritoneum, or true hernial sac, will present itself. These investments of the hernial sac, as I have already related, are generally much thicker than the sac itself, which, excepting when the hernia has been often inflamed, or adhesions exist, mostly retains its natural thinness and transparency.†

The operator is now to take hold of some of this cellular substance, which adheres intimately to the anterior inferior part of the sac, with a pair of dissecting forceps, and thus he is to raise the sac itself. Then, with the edge of the knife turned horizontally, he is to make an opening just large enough to admit the blunt end of a probe, or director; upon which Mr. A. Cooper recommends the sac to be further divided upward to within an inch of the abdominal ring, and downward to the bottom of the tumour. The anterior and inferior part of the sac is selected as the place for making the first opening, because the intestine seldom descends so low; and whenever fluid is present, it gravitates to this situation. Mr. Astley Cooper's reasons for not extending the division of the sac nearer to the ring, are to avoid making the closure of the wound more difficult, and to lessen the danger of peritoneal inflammation.

The next object is the division of the stricture. Mr. Cooper directs the surgeon first to introduce his finger into the neck of the hernial sac, for the purpose of ascertaining the exact situation of the strangulation, which he will find either at the abdominal ring, or about one inch and a half from this aperture, in a direction upward and outward; or lastly, in the mouth of the hernial sac.

When the stricture is produced by the abdominal ring, the above gentleman recommends the surgeon to pass his finger into the sac, as far as the stricture, and then to convey a probe-pointed bistoury, over the front part of the sac, into the ring, which is next to be divided, in a direction upward, opposite the middle of the neck of the sac, and to an extent just sufficient to allow the protruded parts to be returned into the abdomen, without hurting them in the act of doing so.

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* Lawrence on Ruptures, p. 212. edit. 3.

† Scarpa, p. 104.

The chief advantages of dividing the ring upward, depend first on the fabric of this aperture not being so much weakened as it would be by cutting upward and outward, and dividing the transverse tendinous fibres, which cross its upper part; and secondly, on the safety of the method, in regard to the epigastric artery, whether the case be the external, or internal hernia *, of Hesselbach. Rougemont † long ago recommended making the incision of the ring in this direction, and the practice has been more recently inculcated by Scarpa.‡ If, however, we were sure of the disease being the less common disease, an internal inguinal hernia, of course, it would then be perfectly safe to cut the ring inwards and upwards. A judicious and very accurate remark has been offered on this subject, by Desault and Chopart: if, (say these eminent surgeons) after the operator has opened the hernia, he finds the spermatic cord on the outer side of the sac, the epigastric artery must constantly be with it on the same side of the § ring, as happens in every internal inguinal hernia, or that which begins to form directly opposite the ring.

As Mr. A. Cooper has explained, however, a frequent situation of the stricture is not at the abdominal ring, but at the place where the sac opens into the abdomen; that is, an inch and a half, or two inches towards the anterior superior spinous process of the ilium from the ring. Here the strangulation is caused by the transversalis muscle and its tendon, which pass over the hernial sac, in a semicircular direction, and by a fascia arising from Poupart's ligament, the semicircular border of which passes under the sac.

In this case, Mr. A. Cooper advises the surgeon to introduce his finger into the sac, through the abdominal ring, as far as the stricture; and then the probe-pointed bistoury, with the flat part of its blade turned towards the finger, is to be insinuated between the front of the sac and the abdominal ring, till it arrives under the stricture, formed by the lower edge of

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* In this less common example, the artery always lies on the outer side of the neck of the sac.

† Richter, Traité des Hernies, p. 125.

‡ "On pourra opérer le debridement avec toute sûrete, en incisant l'anneau, parallèlement à la ligne blanche," p. 111.

§ Traité des Mal. Chir. t. i. p. 265.

the transversalis and obliquus internus. The edge of the instrument is to be next turned forward, and the stricture cut in the direction upward; by which method the epigastric artery can scarcely be cut, whatever be its situation in regard to the sac. The division should only be of such an extent as will allow the finger to pass through the strangulation. In this instance, Mr. A. Cooper also employs a bistoury, the cutting edge of which extends but a little way from the point.

Another advantage, attributed by Mr. A. Cooper to not dividing the sac is, that, in case the epigastric artery should ever be accidentally wounded, the blood could never be extravasated in the abdomen.

When the stricture is caused by the neck of the sac itself, the probe-pointed bistoury must be carefully introduced, and a division made directly upward.

The parts may be strangulated both in the upper and lower openings, at the same time, in which event an incision in each of these situations would be requisite.

Before Mr. A. Cooper published his work on hernia, it was always customary to divide the portion of peritoneum, which forms the neck of the hernial sac; and, as far as I can judge, this method ought still to be preferred.

As Mr. Lawrence observes, the impossibility of blood becoming extravasated in the abdomen, when the peritoneum is not cut, is not an important reason in favour of Mr. A. Cooper's method; because the epigastric artery will not be wounded, when the stricture is divided in a proper manner; and he is convinced, that cutting the stricture without the neck of the sac, would be found highly difficult, if not impracticable, by the generality of surgeons, so firmly are the sac and surrounding parts connected together. The same gentleman also sets down the practice as not advisable, even if it were as easy as the common mode of operating. Mr. A. Cooper leaves an inch of the sac below the ring undivided. Thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished.* Scarpa objects to the plan of leaving the neck of the sac undivided, on another ground, viz. the frequent dependence of the strangulation upon its contracted state; a thing, which, he believes, happens still more commonly than most surgeons suppose.†

Having removed the stricture, the next object is to return the protruded parts into the cavity of the abdomen. Nothing, but the absolutely gangrenous state of the intestine, should deter the practitioner from reducing it; the dark chocolate brown discolourations, with which the protruded part is often affected, generally produce no permanent mischief, and ought to be discriminated from the black, purple, or lead-coloured spots, which are the ordinary forerunners of mortification. The intestine is to be reduced before the omentum; and the portion nearest the ring should be first introduced, and held there by the surgeon's finger, until followed by another portion.

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* Lawrence on Ruptures, p. 232. edit. 3.

† Scarpa, p. 106.

After the operation, it is a point of great importance to ascertain with the finger that the parts are all fairly and freely reduced into the abdomen. Recent adhesions of the intestines to the inside of the sac may commonly be easily broken by the fingers. When the adhesions are old, the cautious employment of the knife is necessary; if they are sufficiently long to allow the intestine to be raised a little from the sac, they may be easily divided. The intestine and omentum remain destitute of their peritoneal covering at the points, where such membranous adhesions were situated; but experience proves, that, after the reduction of the parts, no harm results from the circumstance, and the cure is not even retarded by * it. When they are so short, that the inside of the sac and peritoneal coat of the intestines are in close contact, more skill is requisite, and the adherent parts of the sac must be cut off and returned into the abdomen, still adhering to the bowels. It is but right to state, however, that this practice is disapproved of by Scarpa; first, because this sort of adhesion between the intestine and the sac is most frequently situated in the neck of the latter part, where the object could not be effected without the greatest risk of wounding the spermatic cord; and secondly, because the outer surface of the bowel would present in the situation, where the adhesion was, a bleeding surface, that could not be safely reduced. Scarpa, therefore, recommends us merely to remove the stricture, and not attempt to destroy such adhesions. †

When the adhesions, however, are between the omentum, on one part, and the hernial sac or bowel, on the other, Scarpa approves of Potts' ‡ method, which consisted in dividing the omentum, as close as possible to the adhesion.

As soon as the intestine has been reduced, the omentum, if not diseased, is next to be replaced. However, when it is much indurated or thickened, a portion of it may be cut

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* Scarpa, 158.

† Op. cit. p. 161.

‡ Chir. Works, vol. iii. p. 299.

off. If any small arteries bleed, they are to be tied with a fine ligature. The practice of tying the whole omentum ought to be reprobated in the strongest terms. As Mr. A. Cooper judiciously remarks, it is extraordinary that this custom should ever have prevailed. The very object of the operation is to remove from the omentum the stricture, derived from the pressure of a surrounding tendon; and no sooner is this done, than the surgeon applies a ligature, which produces a more perfect constriction than that which existed before the operation was undertaken. I regret to find Scarpa proposing a modification of this practice; his plan is first to remove the strangulation, and divide all the adhesions, excepting those in the neck of the sac, corresponding to the ring; he then applies simple dressings to the mass of the omentum; and, in about ten or twelve days, when it begins to suppurate, he puts a ligature round it close to the ring. The ligature is to be moderately tight the first few days, and is to be drawn with more force afterwards. It is essential, he says, to cover every part of the omentum with dressings, or else new adhesions form. Scarpa assures us, this method causes no considerable pain, nor any disturbance in the functions of the intestinal canal. *

When a portion of the omentum is mortified, and adhesions within the ring do not render the scheme impracticable, or unadvisable, the dead part is to be cut off, and the rest returned. This membrance is sometimes found converted into a large indolent fleshy mass, weighing two or three pounds. Here it should be cut away, and the bleeding vessels tied with fine silk ligatures.

In cases of large, old, adherent herniæ, it is best to remove the stricture, without laying open the hernial sac, or at most, only the neck of it. The separation of the preternatural connections is often extremely tedious and difficult. As Mr. Lawrence observes, the violence which must necessarily be inflicted, in executing this part of the operation, would be very apt to make the parts inflame. The extensive surface, which must be exposed by laying open the whole of a large hernial tumour; the risk of cutting the spermatic vessels, which often lie in these cases on the front of the lower part of the sac; the occasional impossibility of keeping the returned part in the abdomen; the great dilatation of the ring, and the little hope of a radical cure; present numerous reasons in favour of the plan of only dividing the stricture. An incision,

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* Op. cit. p. 193.

two or three inches long, is to be made in the integuments over the abdominal ring. The fascia covering the sac is to be exposed, and opened. A director may now be passed under the tendon, and a probe-pointed bistoury conducted along the groove to the part which is to be cut. In case of difficulty, the neck of the sac may be opened, and then the director introduced, &c. *

MORTIFICATION OF THE INTESTINE.

The swelling, which was before tense and elastic, now becomes soft, doughy, emphysematous, and of a purple colour. Sometimes the parts now return spontaneously into the abdomen, and the patient survives only a few hours. In other cases, as Mr. Astley Cooper observes, the skin over the tumour sloughs, the intestine gives way, and the feces being discharged at the wound, the symptoms of strangulation soon cease. In this circumstance, the intestine becomes adherent to the hernial sac, the sloughs are thrown off, and thus an artificial anus is established, through which the feces are sometimes discharged during the remainder of life. Though such is the course of many of these unfortunate cases, it frequently happens, that the feces resume their former course to the rectum, and the artificial anus becomes unnecessary, and closes. I have seen several cases of this kind in St. Bartholomew's Hospital.

The degree of danger, which attends an artificial anus, depends upon the vicinity of the sphacelated intestine to the stomach; for, if the opening be in the jejunum, so little space is left for the absorption of chyle, that the patient dies of inanition.

TREATMENT OF MORTIFICATION OF THE INTESTINE.

If only a small slough has taken place, the intestine is to be reduced without any particular proceeding.

In this kind of case, some writers recommend introducing a ligature through the mesentery, in order to confine the mortified part of the bowel near the wound. This proceeding, however, is quite unnecessary, as the disordered part of the intestine never leaves the neighbourhood of the abdominal

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* See A. Cooper on Inguinal and Congenital Hernia, p. 45, 46.; and Lawrence on Ruptures, p. 250. edit. 3.

ring, being kept in this situation by the adhesions of the adjacent parts to each other, in consequence of * inflammation. This statement is confirmed by the opinions of † De la Faye, and Desault. ‡

Even were the mortified part of the bowel not exactly opposite the ring, there would be no reason to fear any effusion of the contents. It appears from the valuable observations of M. Petit §, that the contents of the bowels, and even blood, when extravasated in the abdomen, do not become widely diffused; but are first kept from spreading about by the pressure of the respiratory muscles, and afterwards by the inflammatory agglutination of the surrounding parts.

When the whole cylinder of the intestine is mortified, all the various proposals, mentioned in the preceding chapter on the treatment of divided intestines, have been recommended. One practice has been that of cutting away the sphacelated part of the bowel, and bringing the two ends together, and keeping them so, by means of four stitches, made with fine thread or silk, and a common sewing needle. Then a thread is to be introduced through the mesentery, for the purpose of keeping the ends of the intestine opposite the mouth of the hernial sac.

Mr. Lawrence most properly objects to this kind of practice; because, by drawing the intestine out of the cavity, in order to remove the dead part, the adhesion behind the ring, on which the prospect of a cure entirely depends, must be entirely destroyed; and new irritation and inflammation must be unavoidably produced by handling and sewing an inflamed part. La Peyronie tried the plan of removing the dead part, passing a ligature through the mesentery, so as to draw this membrane into a fold, and bring the two ends of the bowel nearer together. These were then kept near the ring, by means of the ligature. La Peyronie's practice, however, ingenious as it may appear, has now few advocates, and certainly, if it were only on account of the danger of its disturbing those salutary adhesions, which are formed between the living ends of the bowel and the adjacent parts, the practice ought to be condemned. Nor is Littre's treatment more to be commended, which consisted in retaining the superior extremity of the bowel in the wound,

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* Lawrence on Ruptures, p. 287. edit. 3.

† Cours d'Opérations de Dionis, edit. 5. p. 350. note a.

‡ Parisian Surgical Journal, vol. ii. p. 366.

§ Vid. two essays, Sur les Epanchemens, in Mém. de l'Acad. Royale de Chirurgie, tom. ii. and iv. edit. 12mo.

and tying the lower, so as to aim entirely at the establishment of a permanent artificial anus. *

They have generally been the best surgeons in these circumstances, who, like the justly celebrated J. L. Petit †, were content with little interference. If we merely make an outlet for the contents of the mortified bowel, and wait quietly, the sloughs will be cast off; the ends of the gut will be fixed near each other by the adhesive inflammation; the wound will often gradually close up; and the function of the intestinal canal be in time more or less perfectly re-established.

With regard to dividing the stricture, after the intestine has completely mortified, this measure is, in all probability, generally wrong, because it can now answer no rational purpose; and, besides giving unnecessary pain, must tend to disturb the completion of those salutary adhesions, by which the living part of the bowel is fixed to the wound. On this subject, I perfectly coincide with Mr. Travers. When the bowel is mortified, there is, in fact, no longer any stricture, the resistance which rendered it so having been taken off by the collapse of the included gut. ‡ The incarceration has actually done its worst, and the parts acted upon by it being dead, are clearly susceptible of no further harm. Nor can the incision of the stricture now be necessary, on the ground, that it will promote the evacuation of the intestinal contents, since, when the bowel has given way, before the operation, the sac and integuments are always loaded with fecal matter. § The propriety, however, of dividing the stricture, when the gangrenous mischief is but little advanced, is self-evident. When the intestine has mortified, but not burst, it is an important object always to make a free opening into it, so that the confined feces may have a ready outlet. The neglect of this practice, no doubt, has often deprived patients of all chance of recovery; for, while the contents of the bowels remain confined, no amendment in the symptoms can be expected. This method was advantageously practised by Gooch, J. L. Petit, and Mr. A. Cooper ‖; authorities of the highest description.

When the gut has already given way, the propriety of fa-

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* Mém. de l'Acad. des Sciences, an. 1700.

† See Traité des Malad. Chirurg. tom. ii. p. 403, 404.

‡ Travers on Injuries of the Intestines, &c. p. 300, 301.

§ Op. et loc. citato.

‖ Traité des Mal. Chir. p. 299.; Gooch's Chirurg. Works, vol. ii. p. 197.; Hey's Practical Observations in Surgery, appendix to edit. 2.

cilitating the escape of the intestinal contents, by a free incision in the skin and sac, cannot be doubted.*

In the different stages of mortified hernia, mild purgatives, and clysters, nourishing broths, soups, jellies, &c. wine, bark, and cordials, may all be of essential service. Poultices and fomentations are the best applications, till the sloughs have separated.

The celebrated Scarpa† published, a few years ago, some highly interesting remarks on the process employed by nature in repairing solutions of continuity in the intestinal canal, especially in cases of hernia, with gangrene. After noticing the manner, in which the excrement is discharged in these cases through the artificial anus, he observes, that though it is undoubtedly an afflicting and disgusting infirmity, it does not preclude all hope of a radical cure, not even when a considerable portion of the intestinal canal has been destroyed by sphacelus. The recorded examples of such cures are abundant; and yet, says Scarpa, nothing has hitherto been written, which will serve to convey an exact idea of the simple and admirable means which nature employs in accomplishing them. Surgeons have generally supposed, that, after the detachment of the dead parts, the two orifices of the bowel remain separated, and acquire adhesions to the margin of the external wound; that afterwards, in proportion as this contracts, they come gradually nearer together, and, in the end, touch each other so accurately, that the feces are capable of passing directly from the superior to the inferior portion of the gut. But this theory cannot satisfy those, who have attentively examined, in any cases of mortified hernia, the respective situations of the two orifices of the intestines, and their relation to the external wound. In fact, the two ends of the bowel are constantly found lying in a parallel manner, by the side of each other; the upper with its orifice open, and directed towards the external wound by the feces, which issue from it; the lower, on the contrary, as it gives passage to nothing, always with a tendency to become less capacious, and retracted into the cavity of the abdomen. The contraction of the external wound cannot have the least effect in changing the direction of these two orifices, nor, consequently, in applying them to each other. Even supposing there were some natural tendency to this approximation, the upper orifice being wider than natural, and directed outwards, could never accurately coalesce with the lower one, which is shrunk and retracted within the belly. The feces then could never pass from one into the other, without the effusion of a considerable part of them outwardly, and, in every instance, the result would be an incurable fistula, discharging the intestinal matter. Scarpa had an opportunity of examining the body of a young man, who, in consequence of eating a large quantity of indigestible food, died about ten months after having been operated upon for a congenital hernia, attended with mortification of the protruded bowels, at a period when he had recovered, with the exception of an occasional discharge of a very small quantity of feces from an inconsiderable fistulous opening. Scarpa also dissected two other cases; and, from all these, it appears that the breach in the intestinal canal is not repaired by the orifices of the upper and lower portions of the bowel re-uniting, coalescing, and running, as it were, into each other; nay, that the two openings meet at a very acute angle, and never lie laterally together. On the contrary, Scarpa's investigations satisfactorily prove, that a funnel-shaped membranous canal, (what he terms the *imbuto membranoso*,) composed of the remains of the hernial sac, constitutes the medium of communication between the upper and lower orifices of the bowel, which, in an early stage, becomes adherent to the peritoneum, about the neck of the hernial sac. The base of the funnel-shaped membranous cavity corresponds to the bowel, while its apex tends towards the wound, or fistula. It farther appears, that the feces, in order to get from the upper into the lower part of the bowel, have to pass through the funnel-shaped cavity in quite a semicircular track; and that, between the orifices of the bowel, directly opposite to the aperture between the cavity of the intestine, and that of the funnel-shaped membranous cavity, a considerable projection, or jutting angle, is formed, which makes a serious additional obstacle to the direct passage of the feces from the upper into the lower portion of the intestinal tube. *

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* See Pott's Work, vol. iii. case 21; and Travers on Injuries of the Intestines, &c. p. 308, &c.

† Sull' Ernie Memorie Anatomico-Chirurgiche. Folio. Milano. 1809.

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* It is but justice to mention, that some of the preceding facts were well known long before Scarpa published; especially the positions of the two portions of bowel with respect to each other, the diminished size of the lower continuation of the tube, and the ridge or angle between them. See particularly the Obs. of M. Pipelet, " Sur la Réunion de l'Intestin, qui à souffert Déperdition de Substance, dans une Hernie avec gangrene." This author gives us an accurate drawing of the manner, in which the two parts of the bowel lie with regard to each other after the cure. (Mem. de l'Acad. Royale de Chir. t. xi. p. 258.)

FEMORAL OR CRURAL HERNIA.

The bubonocele and femoral hernia were generally confounded together, until Verheyen, about the year 1710, demonstrated their difference. The last case is common in women who have had many children; it is rarely seen in young females, and still more rarely in men. In the latter, the viscera more readily escape through the abdominal ring, along the spermatic cord, than push upwards the aponeurosis of the external oblique muscle, where it forms the crural arch. But the opposite tendency prevails in women, on account of the smallness of the abdominal ring, its lower situation, and its greater proximity to the pubes, than in the male subject; while the crural arch itself in the female is more extensive. The crural hernia, whether in the male or female sex, forms in the cellular membrane, which accompanies the crural vessels under Poupart's ligament; it follows the inner edge of these vessels, and gradually descends to the bend of the thigh, between the sartorius, gracilis, and pectineus muscles.*

The tumour, in fact, takes place below Poupart's ligament, just on the inside of the femoral vein, and, being situated in front of the pectineus, is of course on the outside of the fascia lata. The variety, however, in which the hernia descends into the sheath of the crural vessels, is an exception to the latter statement. Many surgeons have imagined, that the hernial sac and the bowels usually lie over the crural vessels and trunk of the vena saphena, and sometimes betwixt these vessels and the anterior superior spine of the ilium; but, as far as Scarpa's researches extend, this statement is not supported by a single accurate description of a crural hernia in the incipient state. It is true, however, that, when the tumour in time grows very large, and its fundus inclines parallel to the fold of the groin, it partly, or totally covers the crural vessels, and even the crural nerve, as Walter † once observed; but we are not to suppose that the femoral hernia ever begins with descending over the crural vessels, much less that it can be situated, in its early stage, between those vessels and the anterior superior spine of the ilium. Nor must we imagine that, at any time, the hernial sac changes its place from the inner to the outer side of the same vessels. ‡ The direction, in which the parts protrude, is first downwards and then outwards, so that, in attempting the taxis, the surgeon should endeavour to reduce the viscera first backwards, and then upwards and inwards towards the navel, the abdominal muscles, Poupart's ligament, and the fascia of the thigh, being relaxed in the same way, as when an attempt is made to reduce a bubonocele.

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* Scarpa, Traité des Hernies, p. 203.

† Sylloge Comment. Anat. p. 24.

‡ Scarpa, p. 204.

The chief anatomical circumstances, worthy of notice, will be described in the account of the operation. With respect to the diagnosis of the femoral hernia, the tumour is generally much smaller than a bubonocele, and lies so deeply in the bend of the groin, that, in the thinnest subjects, its neck cannot be plainly felt. On the contrary, the inguinal hernia, however small, is never thus deeply situated. When the femoral hernia is large, its neck always lies deep, while its body and fundus assume an oval shape, and their greatest diameter is across the bend of the groin. But, whatever may be the size of a bubonocele, its shape is always pyramidal, the base, instead of tending towards the hip, constantly follows, in the male subject, the exact direction of the spermatic cord into the scrotum. Besides the symptoms common to hernia in general, the crural species, when it has attained a certain size, has some characters which are peculiar to it; such as a sensation of stupor and heaviness in the thigh, and œdema of the leg and foot of the same side. * A femoral hernia, when small, is frequently mistaken for an enlarged gland; but though, in the latter case, the appearance and feel of the tumour may not be sufficient to convey positive information as to the disease being hernia, the general symptoms are those by which we should be guided; and if they be of an urgent but ambiguous nature, it is better, as Mr. Lawrence observes, to use the knife for getting the requisite knowledge, than leave the patient to die without any attempt to save him. Cutting down upon a swelled gland will not be dangerous; and, if the case be a strangulated hernia, it will save the patient. I have seen more than one case, in which the patient lost his life in consequence of the disease being regarded as a bubo. The foregoing circumstances, with others mentioned in a preceding part of this chapter, will always enable the surgeon to distinguish the disease. In old scrotal herniæ, the opening through which the parts descend, sometimes becomes extremely large; but this rarely happens in a crural rupture. Intestine is the part usually contained in the sac, and omentum by itself is seldom met with.

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* Scarpa, p. 208.

The general treatment of the crural hernia resembles that of other ruptures.

OPERATION.

The incision through the integuments should always commence from the point where the hernia protrudes; that is, let it begin just above Poupart's ligament, a little nearer to the symphysis pubis, than the femoral vessels are, and be continued the whole length of the tumour. Any glands, which may lie over the hernia, should be avoided. The sac is still concealed beneath cellular substance, which is here much thicker than where the bubonocele occurs, and beneath aponeurotic fibres, which proceed from the femoral fascia, ascend obliquely over the front of the thigh, and are connected with the lower and external part of the tendon of the external oblique muscle. These fibres must be divided before the hernial sac can be exposed. It is to be understood, however, that the femoral hernia is on the outside of the fascia lata*, except in a few instances, in which the parts enter the sheath of the femoral vessels. Hence, the operator should make his incisions very cautiously; as the sac, which is usually very thin, lies immediately under the integuments, with the intervention of only a few ligamentous fibres. These may be most safely divided, when a director, or probe, is placed under them.

The hernial sac is to be opened by means of a pair of dissecting forceps and bistoury. The operator is to raise the part by taking hold of the cellular membrane attached to it, and is then to make a very small aperture by a superficial horizontal cut. Through this opening a director may be introduced, and the surgeon may then safely divide the sac nearly as high as Poupart's ligament, and quite to the bottom of the tumour.

The next object is to divide the stricture. Until the last few years, practitioners supposed the stricture, in these cases, to be always caused by the front edge of the lower border of the external oblique muscle; in other words, by Poupart's ligament; and, consequently, its division was generally deemed the chief point of the operation. Le Dran, in operating for a crural hernia, very long ago observed, that the closest strangulation was not made by this ligament *; and when he divided the neck of the sac, no doubt he cut what Mr. Hey has since named the *femoral ligament*, the part generally producing the pressure on the strangulated viscera. Gimbernat is entitled to the honour of having first explained what part it is that really forms the strangulation. †

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* In the System of Operative Surgery, on the Basis of Anatomy, the author has erroneously described the femoral hernia as lying under the fascia of the thigh.

The lower border of the aponeurosis of the external oblique muscle, as Mr. Lawrence remarks, has a broad insertion into the pubes; this attachment, which begins at the angle, runs along the crista of the bone. Its position, therefore, in the erect state of the body, is nearly though not entirely horizontal; consequently, its two margins should be described by the epithets anterior and posterior; it being remembered, at the same time, that the former of these is rather higher, than the latter. That part of it, which is fixed to the angle of the bone, has the appearance of a firm, and somewhat round tendinous chord. Its insertion into the crista of the pubes is effected by means of a thinner portion, which gives to the tendon a clearly defined sharp edge at its posterior margin, and is more deeply situated, than the former part attached to the angle of the bone. ‡

It is this thinner, deep-seated, sharp-edged, posterior margin of Poupart's ligament, near the pubes, that occasions the strangulation in cases of femoral hernia, and requires to be divided in the operation. Hey terms it the *femoral* ligament. There is however another part, which has some share in producing the strangulation. Where the attachment of the fascia lata to the crural arch terminates, it forms a *semilunar* || *fold*, with the concavity turned towards the pubes, or opposite limb. This fold bends under the crural arch, so as to unite to the femoral ligament at its commencement, and, consequently, it must contribute in some degree to the stricture.

Gimbernat has called the space beneath Poupart's ligament the *crural arch*. The anterior crural nerve always passes on the outside of the sheath for the femoral vessels, towards its external and posterior part. Before the external iliac artery enters, it sends off the epigastric. This vessel passes obliquely inward, between the crural arch and spermatic vessels. Im-

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* Observ. 57.

† See an Account of a new Method of operating for Femoral Hernia, by Antonio de Gimbernat. The original was first published at Madrid in 1793.

‡ Lawrence on Ruptures, p. 367, 368. edit. 3.

|| This part has been excellently described by Mr. Lawrence, p. 373, &c. edit. 3.; and by Mr. A. Burns, in Edinb. Med. and Surgical Journ. vol. ii. p. 265, &c.

mediately on the inside of the crural vein, there is a foramen, sufficiently distinct, almost round, at which many lymphatics enter. It is sometimes stopped up by a lymphatic gland; but the parts, which form the crural hernia, always pass through it, and consequently, Gimbernat calls it the *crural ring.* It is bounded above and in front by the posterior edge of Poupart's ligament, and the semilunar, or falciform process of the fascia lata; below and behind by the pubes; on the internal or mesial side by the thin border of the tendon; and on the outer or lateral part by the crural vein. It is much smaller than might be imagined, since the large space under Poupart's ligament is elsewhere completely occupied, and also strengthened by an aponeurosis, which is derived from the iliac and psoas muscles, and extends from their surface to the crural arch, ending just over the crural vein. *

Having laid open the hernial sac, in the manner above recommended, a director should next be introduced within the crural ring, on that side of the intestine, or omentum, which is nearest to the symphysis of the pubes, and an incision should be made directly upward (according to Mr. Hey) for the purpose of cutting that part of the ring, which this gentleman names the *femoral ligament.* Gimbernat recommends introducing a director into the ring, with its back towards the intestine, and its groove towards the symphysis pubis. Along the groove a narrow probe-pointed bistoury is to be introduced into the ring, in order to divide the internal edge of the femoral ligament as close as possible to its insertion into the pubes.

On account of the depth of the posterior margin of the crural arch, the closeness of the stricture, and the risk of wounding the intestine, Mr. Astley Cooper prefers dividing the stricture on its anterior part, that is to say, he cuts the semilunar, or falciform process of the fascia lata, as far as the front margin of the crural arch, directing the edge of the knife upwards and inwards. If this is not sufficient, he afterwards divides the thin posterior border of the tendon in the same direction. In the male subject, he makes a small transverse incision above Poupart's ligament, and draws the spermatic cord out of the way of the knife with a bent probe. I have had no opportunities of seeing this practice; but dividing the femoral ligament in the direction recommended by Gimbernat appears to me to deserve the preference, the only danger attending it being that of injuring the obturatrix artery in the occasional varieties, in which this vessel originates from the epigastric, and passes over the inner side of the neck of the hernial sac. Were such an arrangement of the vessel to occur, however, I think a cautious and circumspect operator would be likely to feel its pulsation, and at all events, by cutting slowly and only a few fibres at a time, with a probe-pointed bistoury, avoid injuring it.

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* Lawrence, op. cit. p. 370, 371.

END OF THE FIRST VOLUME.

Printed by Strahan and Spottiswoode,
Printers-Street, London.